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ABSTRACT

The purpose of the Dyslexia Association, established by school officials, teachers, and parents of the Natchez-Adams County School District, was to explore the nature, diagnostic techniques, and remediation of this learning disability in order to establish a specific program in the public schools. Procedures were developed which could be used by para-educational personnel as instructors under supervision. In addition, the members of the association were concerned with the development of programs which might reduce treatment time, be incorporated into the ongoing school operation, and, be economically feasible. The point of view of the project director, in making final decision on the program model, was that specific development dyslexia was a neurological dysfunction and that there was strong evidence that this dysfunction was hereditary. Further, that there were related disorders to the specific reading dysfunction, which were probably not of a hereditary nature but resembled dyslexia and included other characteristics as well. The Alphabetic-Phoenetic-Structural Linguistic Approach to Literacy were the materials and methods used. (Author/JM)

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Perceptual Development Center

for

Children with Dyslexia and Related Disorders

FINAL PROJECT REPORT

Natchez Special Municipal Separate School District
NATCHEZ, MISSISSIPPI

Director, Mrs. H. Lee Jones, Jr.

In Coöperation with
The Department of Health, Education and Welfare
Title III ESEA Grant No. OEG 3-7-704991-5110

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Credit is given, Miss Ann Harvey, Supervisor of Testing, for her collaboration in writing this report and her collection of the data presented.

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This final Project Report of the Perceptual Development Center (PDC) for children with dyslexia and related disorders is an attempt to detail all of the research prior to the program funding, considerations in setting up the program, information learned through the operation of the program and suggestions for further work indicated by the program's results. The report is the result of the work of the entire PDC teaching, testing, secretarial and administrative staff. Appreciation of the staff's dedicated efforts to use an innovative model and adapt it to the needs of children with dyslexia and related disorders in their particular school system is beyond expression.

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Gratitude for their support and constant cooperation is extended to the federal and state Title III officers, especially Warren Aaronson, Ph.D., Frank Della, W. O. Best, and their helpful staffs.

Special thanks is given to the project medical consultant, Donald Killelea, M. D., for his contributions to the operation of the program and his advice on the medical aspects considered in this report.

Credit for the possibility of innovating a successful project is given to Charles L. Shedd, Ph. D., Chief Consultant, who provided a public school program with the methods and material for testing and teaching students with dyslexia and related disorders and who offered the experimental design of this project.

McLeod (1966) has pointed out:

"It might well be that the existence of dyslexia is more obvious clinically than semantically. It might well be dyslexia has become an abused and emotionally charged word. It might be that some clinicians have asserted the existence of dyslexia with a dogmatism that has sometimes tended to vary inversely as the experimental rigor with which they have gathered their data, but they are not fools."

Parents who almost literally jam the doors of dyslexia centers are not all fools. Many of them know that their children are not unintelligent, unmotivated, suffering from an adverse home condition or cultural deprivation or sensory disability or brain damage. They also know that they cannot learn by current methods. (Shedd 1968)

Definition - Specific Developmental Dyslexia

A disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and socio - cultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin.

Research Group on
Developmental Dyslexia
and World Illiteracy
MacDonald Critchley,
President

The Report of Secretary's (HEW) National Advisory Committee on Dyslexia and Related Reading Disorders (August, 1969) released many disturbing statistics.

This report states that:

* Eight million children in America's schools today will not learn to read adequately.

* The present enrollment in primary and secondary grades of our public schools is 51,500,000. The average cost per child per year is $696.00. If one child in twenty (5%) is not promoted, the national loss expressed in economic terms alone is $1.7 billion. "Unless the causes of failure are determined and specific remedial instruction is provided, a child profits little from repeating the same grade."

* In the Federal Bureau of Prisons with 20,000 inmates, one half are less than 26 years of age. 96% of these dropped out of school before completing high school. 90% were having reading problems.

* The problem is nationwide and compounded by the shortage of persons adequately trained to instruct the failing reader.

In short, the report's well buttressed main idea is that the work of researchers in the field of dyslexia and reading disorders is of national scope and urgency and points to a new concept in academic equilibrium.

The scope of the problem becomes apparent when we observe that Hallgren (1950) found 18 percent of the school age population in Stockholm were dyslexic, Gripenberg (1963) reported 23.5 percent in Helsinki, Gjessing (1958) reported 3.4 percent (only severe cases) in Norway, Preston (1941) reported 20 percent for the United States. Conservatively 10 percent of the school age population are dyslexic and require remedial help. In the United States this means that 3.5 million children require help. (Shedd, 1968)

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Section I: Introduction

A. Statement of Problem

For many years school officials, teachers, and parents of the Natchez-Adams County School District have been aware of and concerned about children with learning disabilities. It was recognized that there were no ready-made solutions to the local problem, but that some relatively specific program with an exploratory orientation might serve as a beginning in the recognition and remediation of learning disabilities. In 1959, a program directed specifically toward speech and hearing disorders was initiated. This program established recognition, referral, evaluation, and remedial procedures for speech and hearing disabilities. Early in the operation of this program it was noted that children with mild articulation problems, problems of auditory discrimination, and problems of attention constituted a large number of the referrals. These children were not the subjects of speech and hearing remediation as ordinarily conceived. Further evaluation of these children by psychologists, psychiatrists, neurologists, and pediatricians indicated that the nature of the difficulty was dyslexia or some related disorder.

School personnel, therefore, cooperated with individuals in the community in the establishment of the Dyslexia Association. The purpose of this organization was to explore the nature, the diagnostic techniques, and the remediation of this learning disability with the aim of establishing a specific program in the public schools. In 1967, a Title III grant was obtained which provided the financial base for the realization of a program which had evolved from the previous effort. From the beginning, the Natchez Perceptual Development Center, established under this grant, was a response to a community awareness and concern.

B. Significance of Problem

National concern and awareness has been seen increasingly over the three years of the grant operation. Most recently James E. Allen, Jr., former U. S. Commissioner of Education, cited data in the January 26, 1970 issue of U. S. News and World Report showing that:

* " Twenty-five percent of the nation's students have "significant reading deficiencies," and that among adults there are more than three million illiterates.

National advisers to President Nixon state that:

* Previous Title I and Headstart programs have failed and that smaller classes, large amounts of money and fancy equipment did not buy improvement in education. They suggest new looks be taken at these programs and only successful procedures be funded nationally.

Section II: Review of Related Literature

A. History

Though recent studies show reading deficiency to be a national problem requiring Presidential concern, recognition of specific reading disabilities such as dyslexia and related disorders have been researched for many years.

Dr. Sylvia Richardson summarized the history of specific reading disabilities effectively: (Richardson 1969)

"Although reading disability was first described by physicians, educators have ignored the medical term, dyslexia. This term was suggested in 1887 by the German neurologist, Berlin, to replace "word-blindness," first proposed by Kussmaul in 1887. The neurologists used these terms to isolate a central or aphasic loss of the ability to read as a result of known brain injury. In 1895 the ophthalmologist, Hinshelwood, wrote his classical paper on the subject. The earliest reports on dyslexic children were published in 1896 by Pringle Morgan and James Kerr. Morgan described his 14 year old patient as having "congenital word-blindness." In 1917 Hinshelwood reported on a number of children who had been referred to him because their reading difficulty was considered due to some disorder in vision. This did not prove to be the case. Hinshelwood emphasized the importance of two observations: that there were often several cases in one family, and that their symptoms were closely parallel to those which appeared in adults who had lost the capacity to read because of injury to the brain. Hinshelwood was convinced on the basis of post-mortem examinations that under-development of, or injury to, part of the brain might lead to reading failure. He concluded that any abnormality in the angular gyrus of the left side of the brain in a right-handed person might cause failure in reading. Such abnormality might be due to disease, birth injury, or faulty development. He also said that varying degrees of brain damage or dysfunction might account for varying degrees of reading deficiency.

Following Hinshelwood, attitudes and opinions toward reading disability have oscillated like a pendulum. In the 1920's Apert and Potzi postulated developmental delay of functional rather than anatomic nature and there gradually arose the notion of a developmental or maturational lag to explain dyslexia. In the early 1930's, the American neurologist, Samuel T. Orton, entered the scene. In his book entitled READING, WRITING AND SPEECH PROBLEMS IN CHILDREN (1937), Orton stressed that language is a function of the central nervous system and stated ". . . attempts at teaching reading and writing before the age of six years were unprofitable. It may therefore be pertinent to inquire whether the cortices of the angular gyrus region have reached a sufficient anatomical or physiological maturity before this period to make reading and writing practical." In discussing obstacles encountered by certain children in gaining a normal mastery of language, of which reading is one component, Orton also mentioned brain damage as the first and most important factor. After repeated attempts to localize the area of damage he stated, "While no area of the brain can be designated as the center for reading because

of the complexity of the symptoms, we can, nevertheless, nominate an area in the dominant hemisphere whose integrity is essential to maintaining a normal reading skill and this critical area for this fraction of the language function is the angular gyrus and its immediate environs."

It is interesting to note that, at approximately the time that Dr. Orton became involved with this problem and proposed the term "strephosymbolia," Monroe came forth with her very important book, CHILDREN WHO CANNOT READ (1932). Educators, educational psychologists and sociologists then became concerned with the problem, but their writings rarely refer to the existence of a specific and organically determined defect in reading as taught by most neurologists. Gradually, reading disability became a rather nonspecific condition that could be brought about by a multitude of factors. The multifactorial notion reached a peak when Robinson listed at least a dozen causes or types of reading failure in 1946. It should be pointed out, however, that both Fernald and Gillingham, the authors of the two best known remedial reading techniques, felt that neurological factors were involved. Fernald suggested that the condition was "due to certain variations in the integrated brain functioning involving the same region as that in which the lesion is found in acquired alexia."

Current neurological thinking has been stated succintly by MacDonald Critchley in his classic little volume, DEVELOPMENTAL DYSLEXIA (1964). He stated, "The arguments in favor of the existence of a specific type of developmental dyslexia occurring in the midst of but nosologically apart from the 'olla podrida' of bad readers, may be said to rest upon four premises. These comprise: persistence into adulthood; the peculiar and specific nature of the errors in reading and writing; the familial incidence of the defect; and the frequent association with other symbol-defects." He alsc pointed out that neurologists do not deny that many cases of failure to learn to read fall outside of their conception of a specific defect.

If we then summarize neurological and educational views of the young illiterates in our schools we may find: (1) children with a familial or constitutional dyslexia ("pure" and uncomplicated by neurological and/or environmental handicap); (2) reading retardation along with other learning and behavioral problems, secondary to brain injury; and (3) reading retardation secondary to psychological, educational, and/or environmental causes. The latter would include anxiety, which can cripple a child, and unrealistic adult expectations in school or at home.

B. Characteristics

Researchers over the past fifteen years have been concerned with delineating the specific characteristics of dyslexia. Though some groups such as the President's Committee on Dyslexia and Related Disorders (August 1969) have not been able to provide a definition of dyslexia acceptable to all members of differing viewpoints, the first meeting of the Research Group on

Developmental Dyslexia and World Illiteracy which took place at the Language Research and Training Laboratory of the Texas Scottish Rite Hospital, Dallas, Texas on April 3 - 5, 1968 formulated and unanimously approved the following:

1. Special Developmental Dyslexia.

A disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and socio-cultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin.

2. Dyslexia.

A disorder in children, who, despite conventional classroom experience, fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities.

Critchley, President of the World Federation of Neurology and a member of this group, goes on to state that errors made by the dyslexic individual were committed by the normal reader at one time or another. However, that dyslexia was a specific type apart from other types of reading disabilities was recognized by its persistence into adulthood, the peculiar and specific nature of the errors in reading and writing, its resistance to remedial teaching, the familial incidence of the defect, and the frequent association with other symbol defects. (Critchley, 1964)

> The term is to be understood to signify a defective capacity for acquiring, at the normal time, a proficiency in reading and writing correspondent to average performance; the deficiency is dependent on constitutional factors (heredity); is often accompanied by difficulties with other symbols (numbers, musical notation, etc.); it exists in the absence of intellectual defect or of defects of the sense organs which might retard the normal accomplishment of these skills; and in the absence of past or present appreciable influences in the internal or external environment. (Hermann, 1959)

The disability first appeared in reading, then in writing and spelling. Later it may have affected performance in geography, history, mathematics and foreign language. If the condition was severe, higher education might have been impossible. If the dyslexic learned to read, his reading was not facile. He rarely learned to spell. On the other hand, the dyslexic may have acquired proficiency in subjects not dependent upon reading. (M.D. Vernon, February, 1962)

Intellectually the dyslexic person was average or above, having no mental defect. He usually had no visual or auditory organ impairment. Emotionally

he was free from serious primary neurotic traits; although because of the manifestations of his disability, he may have had secondary emotional overlay. He had no gross neurological deficits, but sometimes as marked by a delayed or incomplete establishment of one-sided motor preferences. (Critchley, 1964)

These children were also known by their variability of performance. Errors in reading were present at one time and not another. Their reading indices may have varied from day to day. They were also characterized by varying degrees of distractibility and fatigue. (Critchley 1964)

The characteristics involving reading were numerous. The dyslexic could not learn by the "look-and-say" or global systems of reading instruction because he could not remember word patterns or word pictures. (Schiffman, 1961) He failed to recognize likenesses and differences between words similar in spelling, sound or general configuration. (Critchley, 1964) He read long words better then short because of the more distinctive configuration or details of long words. He had an uncertain memory for shapes of letters and could not obtain a general impression for comprehension of the whole even if he tried to analyze it. (Hermann, 1959)

He incorrectly pronounced vowels and consonants. He was confused in the orientation of letters such as b and d and p and q; in the order of letters in words such as was and saw, on and no, and left and felt; and in short sequences of words. Because of such reversals he had been called a "mirror-reader." (Schiffman 1962)

In addition, he interpolated phonemes incorrectly in words like trick and tick or, conversely, dropped them entirely, calling tick rather than trick. Perseveration or repetition of syllables or individual letters was common. Also in reading the dyslexic substituted meaningful words for words in the text. He found difficulty in switching from the right end of a line of print to the beginning of the next line at the left. He was likely to guess wildly at the pronunciation, particularly of unfamiliar words. The errors also lead to undue vocalizing of sounds while the dyslexic was attempting to read silently. At times he simply refused to read a word or phrase. (Critchley, 1964)

In the person with dyslexia there was a general failure to read with understanding. The problem lay in his inability to grasp the mechanics of reading. "He cannot associate the printed word with the appropriate unit of experience." (Myklebust and Johnson, 1962) Dyslexics had difficulty in establishing concepts, particularly those involving letters of the alphabet. (Money, 1962)

Besides the primary traits described above, the dyslexic child often had secondary language difficulties or delays. Speech might have been imperfect or delayed. Those with specific dyslexia were poor oral readers. (Critchley, 1964) Slight problems with articulation in irregular speech patterns have been observed, (Roger H. Sanders, 1962), "cluttering" and infantile perseveration

of speech was associated with dyslexia. (Hardy, 1962)

Dysgraphia was observed in some dyslexics.

> "An overall untidiness of penmanship is common but is not an essential for occasionally a dyslexic will write in quite a neat fashion with all the errors conspicuously displayed. Among the characteristic defects in writing the dyslexic may show: malalignment; intrusion of block capitals into the middle of a word; omissions or repetitions of words and letters; rotation of letters; odd punctuation marks; and misspellings. Besides the common error of the ignorant or of the habitual bad speller, unusual and even bizarre mistakes are to be found. Typical faults comprise the partial or complete reversals of groups of letters so that for the word NOT we may find OUT or TWO, or even TON." (Critchley, 1964)

Unorthodox joining of adjacent letters was common. The linkages were too long or short, and the strokes intersected. The general tendency was ". . . for the dyslexic to spell as he writes, phonetically . . . ." (Critchley 1964) although writing might have been spontaneous from dictation, writing copied from a model was poor. (Benton 1962) The dyslexic experienced difficulty in notetaking and copying from the blackboard. (Saunders, 1962)

Subsidiary neurological signs may have accompanied dyslexia. Spatial disabilities were found in drawings and modeling; in use of prepositions such as on, under, and below; in mathematical calculations on paper; in left-hand margins which were either too narrow, too wide or which descended obliquely; and in combinations of topographical and corporal awareness in the use of maps and clocks or in giving directions. Corporal awareness disabilities became apparent when the dyslexic was dressing, tying his shoe or trying to name his individual fingers. The dyslexic's disorders of motility affected his ability in ball games and in puzzles. Temporal disturbances appeared when the dyslexic individual encountered sequence; rhythm; naming of the days of the week, month in the year, or years in sequence; history; tenses of verbs; and remembering past events. The disabled child had difficulty in distinguishing colors or in naming colors correctly. Motility disorders also affected a general awkwardness in motor activities of the child. (Critchley, 1964) Many of the neurological manifestations occurred inversely with the age of the dyslexic. The younger the child, the more likely was the appearance of the neurological signs. (Critchley 1964)

Richardson (1966) has pointed out: Rather general agreement can be found among teachers, psychologists, neurologists and pediatricians that characteristic behavioral signs include: 1. poor auditory memory, 2. poor auditory discrimination, 3. poor sound blending, 4. poor visual memory, 5. poor visual discrimination, 6. inadequate ability in visual and visual-motor sequencing, 7. lack of or a weakly established cerebral dominance, 8. right-left confusion with problems of laterality and directionality, 9. fine motor incoordination, 10. non-specific awkwardness or clumsiness, 11. ocular imbalance, 12. attention defect and disordered hyperkinetic behavior.

C. Etiology

As has been noted previously, the syndrome of dyslexia has been known for many years by neurologists, educators and psychologists. Perhaps because of lack of definition of a tangible central nervous system lesion and because of, until recent years, there was no good clinical or laboratory methods of evaluating subtle central nervous system pathology, the discipline of medicine had not been as keenly interested in the problem as that of education and psychology. These latter two disciplines, although interested in etiology, have confined themselves more to elucidating the problem, defining characteristics of the syndrome, and attempting remediation of a problem that was in existence. Confusion has arisen in determining etiology as in defining the characteristics of learning disabilities and, especially, specific disabilities such as dyslexia. This has perhaps resulted partly from the fact that frequently authors have described large series of children with multiple problems in school, and various clinical and psychological findings while not recognizing that such heterogeneous group may be caused by several etiological mechanisms, and have employed general categories.

A review of the literature of the last 10 years in medical journals concerning prematurity, small for gestational age infants, birth trauma, malnutrition, metabolic disturbances, dehydration, central nervous system infections, cultural deprivation, jaundice, hypoglycemia, and neurological dysfunctioning indicates a growing concern on the physician's part as to what role these factors play in specific learning and behavior disorders. For approximately the last 15 years, physicians, particularly obstetricians, and pediatricians have become increasingly concerned with "high risk babies." In the past, if a baby was born apparently normal and dismissed from the hospital with normal life signs, the physician felt he had a normal baby. However, as sophistication has increased in the area of learning disabilities, the physician has become more sensitive to the pre-natal, natal, and post-natal factors which can cause subtle learning disorders at a later date. No longer does the careful pediatrician check the baby for gross maladies but now he more precisely notes any deviation from the norm in the family or birth history for future reference. Further, he will carefully record any evidence of hypoxia, jaundice, or other illness no matter how apparently trivial.

The most articulate exponent of a maternal etiology have been A. A. Kawi and B. Pasamanick, who found that in 16.6% out of a series of 205 children with reading retardation, there had been complications during the mother's pregnancy such as preeclampsia, bleeding, or hypertension. Of a control group of normal readers maternal incidents of this kind occurred in only 1.5%. In the authors' view, severe difficulties of this type can lead to stillbirth, abortion and pre-natal death while in a descending gradient, lesser difficulties conduce to cerebral palsy, epilepsy, and behavior disorders whilst the most benign form of brain damage is followed by faulty speech and congenital dyslexia. (Critchley 1964)

Considerable literature has accumulated on the effects of prematurity on a newborn and his psychological attainments later in life.

In 1956 Knobloch, et al reported on the physical and mental status of 992 infants who were given the Gesell Developmental Examination as well as a routine physical examination. This group consisted of 500 single born premature infants who were compared to 492 term born infants. The comparison was made at age forty weeks for the full-term infant and at the corresponding corrected age for the premature infants. The two groups were matched as to race, socio-economic status and other significant factors. The incidence of abnormalities was found to increase as the birth weight group of the infant decreased so that 50.9% of the infants with a birth weight less than 1501 grams had defects ranging from minor neurological damage to severe intellectual deficiency. Some of these also had major visual handicaps.

In a later report Knoblock and Pasamanick (1959) noted that as the birth weight of an infant decreases, the amount of disability in a variety of aspects of growth and development increases. In regard to neurological status, for example, 26.3% of those infants with a birth weight of 1500 grams or less have neurological abnormalities of sufficient degree to cause serious concern about their future development. The comparable figures for the remainder of the premature infants and for the full term control are 8.2% and 1.6% respectively. Corresponding figures for the percentage of those with minimal cerebral damage which they believe to be the precursor of later learning and behavioral difficulties are 22.8%, 16.8%, 16.0%, and 10.0% respectively.

In 1965, Gerald Wiener reporting on 442 low birth weight children compared to 415 full term children when examined at six to seven years of age, using a battery of six psychological tests and controlling such factors as race, maternal attitude, and social class factors, concluded that premature children are psychologically impaired and this degree of impairment increases with decreasing birth weight, however, they felt that lower birth weight as a cause of poor performance was seen largely in those infants associated with some degree of perinatal trauma or a composite index suggestive of neurological damage or both. These children also showed more difficulty in the perceptual motor area, had more difficulty in comprehension and abstract reasoning, displayed more perseveration, poor gross motor development, immature speech, and IQ impairment than the term infants.

Wiener, et al, in a further study of the same group at age eight to ten years of age, still point out that low birth weight children are impaired on a wide variety of psychological factors including ten subtests of the Weschler Intelligence Test for Children. The degree of impairment is greatest for children with smaller birth weight. When intelligence test data for eight to ten year old children are compared with the data obtained on these same children at age six to seven years, it appears that "catching up" has not occurred. It should be emphasized that the impaired performance represents

a relative group trend; however, low birth weight, when associated with indicators of neurologic pathology constituted a high risk category. Douglas, in his study of prematurely born children at eight years of age, found these children scored less than their control in test of reading, vocabulary and intelligence but were proportionately the most handicapped in reading.

Moreover, when the same children followed by Wiener were tested again at age twelve to thirteen they were found to be still relatively impaired on tests of reading and arithmetic achievement. Grade placement was below age expectation. The effect of low birth weight was not as pronounced for reading as for arithmetic and this finding was consistent with earlier findings. It was felt the educational implications for the factor of low birth weight could become more impressive when the epidemiological correlates of low birth weight were considered. Negroes, lower socio-economic individuals, and people with inadequate medical care have a relatively high incidence of this disorder. It was felt that the consequences of prematurity and other perinatal pathology may account for a significant portion of the academic figures so frequently observed in disadvantaged children.

More recently, Eaves, et al., (1970) in a prospective study of 502 low birth infants as compared to 207 control in which developmental and psychological test scores were obtained present data to show once again that children of low birth weight subsequently, perform less well than controlled children of full birth weight, at least throughout infancy. Small for gestational age infants do much better for at least 18 months than similar weight premature infants, presumably because their nervous system is more mature at birth in accordance with their greater gestational age. At four years of age, however, they found the mean abilities of different weight groups have become similar. Some of this change in the magnitude of the differences may be attributed to the use of different psychological measures. The infant subtest used in this study (Griffiths') has five subtests involving locomotion, personal social development, hearing, speech, eye-hand coordination and performance, while later childhood psychological measures emphasize language and concept development. This study also involves examination of a social economic factor in which the social class rated I through V of 212 children with birth weights less than 2041 grams relative to IQ was examined. When low birth weight children were compared with controls of full birth weight and of comparable social backgrounds, the latter group performed better on the Griffiths' test; however since differences were greater in social classes IV and V than I and III, the effect of low social class may compound the difficulty of low birth weight. Later in life these difficulties are even greater. Children in low social classes begin at a low level and change little while in the higher classes improve and by 4 years of age obtain much higher scores on IQ. The authors feel that birth weight is the dominant factor determining the rate of mental development in children of low birth weight during infancy, where as socio-economic factors may become a more important consideration later.

The problem of hyperbilirubinemia has been investigated many times. The usual studies relate to kernicterus and severe intellectual and motor disorder. However, Hyman et al (1969) feels hyperbilirubinia may cause brain damage of a more subtle and non-specific nature than the classical atheposis indefinus.

In a recent study Gartner, et al, (1970) reported on autopsy findings in 16 premature infants that died between the 3rd and 6th day of life of which 9 showed evidence of yellow staining of the brain with necrosis of brain cells in the stained areas, thus meeting the pathological diagnosis of kernicterus. The total serum bilirubin concentration of this group ranged from 9.4 mg. to 15.6 mg. per 100 ml'. whereas in the other group total serum bilirubin levels were from 8.8 mg. to 17.2 mg. per 100 mls. In no instance was kernicterus diagnosed in the antemortem state. This would make one wonder as to the long range effects of even mild hyperbilirubinemia on the premature that survived without apparent neurological disorder, or, the term infant that also developed mild hyperbilirubinemia from any cause that survived, reference to his future psychological and intellectual capacity. Ackerman, et al, (1970) felt from their study that a level of 20 mg. per 100 mls. is too high a criterion to use for exchange transfusion in small, critically ill, premature infants. Gartner, et al, commented that from their observations a recommendation that all sick, low birth weight infants receive exchange transfusions at serum bilirubin concentrations of as low as 9 or 10 mg. per 100 mls. be performed. However, they note this would result in performance of exchange transfusions in well over half of all low birth weight infants and perhaps, a marked increase in overall mortality.

The recent advent of phototherapy for hyperbilirubinemia conceivably should cut down on the exchange transfusion need by preventing the rise of the level of total serum bilirubin in the infant. However, the usefulness of phototherapy is not in the infant already jaundiced, but in the small, critically ill, and particularly bruised, premature infants in whom hyperbilirubinemia can be anticipated according to Lucy, et al, (1968)

Of late, there has been increased attention given to the ill effects of brain development resulting from malnutrition in utero or in early infancy. Winick and his group using biochemical techniques to estimate total DNA, RNA, protein, and brain weight for the computation of brain cell size have made considerable contribution along this line and have noted that severe, early malnutrition retards cell division in the human brain. (Winick, 1969)

This computation is based on the fact that DNA is found almost exclusively in the nucleus of a cell and in a fixed amount. Therefore, as DNA increases in an organ this must represent an increase in cell number. Further weight increase of the organ with no increase in the DNA content then is due to increase in protein content of each cell.

Fish and Winick, (1969) emphasize that organ growth is not a homogeneous process, especially in the brain. They note that specific regions may grow at varying rates in the rat brain, and found a marked increase in cell numbers of the cerebellum between the 6th and 17th days, whereas in the cerebrum, cell numbers increased more slowly but for a longer period of time. In the brain stem, the increase in cell number was slowest and occurred for the shortest time. If malnutrition occurred, beginning either in utero or immediately after birth, brain growth is retarded by interfering with cell division. If re-feeding is initiated after the period of cell division, recovery does not take place. If, however, an adequate diet is instituted after the period of cell division has ended, no effect on DNA content or cell number is seen. Instead, the protein DNA ratio is reduced but returns to normal when the animal is subsequently re-fed. This would imply then that different functional areas of the brain could be disturbed depending upon the time malnutrition has been allowed to occur.

Analysis performed on fetuses obtained at theraputic abortion and infants who died accidentally showed that the number of cells in the brain increases linearly until birth and then more slowly until 6 months of age, after which an increase in weight only continues until adolescence. The brains of Chilean children who had died of malnutrition within the first year of life all contained fewer cells than normal then when compared to the brain of 10 "normal", well nourished Chilean children who had died accidentally. In several brains, the DNA content was only 40% of the expected figure. (Winick, M., Rosso, P.: The effect of severe early malnutrition on cellular growth of human brain. PEDIATRIC RESEARCH (1969)

In a study of 19 malnourished infants by Chase and Martin (1970) ten infants in whom undernutrition persisted longer than the first four months had a mean DQ of 70 three and a half years later. In the nine where malnutrition was corrected before four months of age, there was a normal DQ three and a half years later. These authors noted that longer follow-up will be necessary to determine all the ill effects of malnutrition in this early period, especially since damage to the central nervous system as evidenced by minimal brain dysfunction, specific learning disorders or perceptual problems may not be diagnosed until later childhood.

Stoch and Smith (1963) demonstrated on follow-up of children who had been malnourished, there was severe functional impairment but noted it was impossible to determine how much of the effect was due to malnutrition and how much to the associated adverse socioeconomic conditions including poor housing, poverty and parental neglect. Other workers in Mexico and Guatemala felt the poor performance of school and pre-school children on psychological testing was related to dietary practice rather than to socioeconomic variables. (Cravioto, S., et al) They also noted these variable were lower in children that had been malnourished in the first 6 months of life.

The long term effects of encephalitis and meningitis on survivors of these severe disorders is coming under scrutiny. At the meeting of the American Pediatric Society and Society for Pediatric Research, in 1970, Dr. Sarah Sell of Vanderbilt University reported on 21 children who had recovered from influenza meningitis before the age of three. These children were 6 to 15 years old at the time of testing and were compared with the siblings closest to them in age on the Weschler Intelligence Scale. The mean IQ for children in the study was 86 while that of their sibling controls was 97. Another study evaluated the psychological and perceptual performance of 25 children who survived bacterial meningitis before the age of 3 with no apparent sequalae. All of these children were enrolled in regular public school classes. Study children has significantly lower mean scores than their controls on such parameters as psycholinguistic development, visual perception and vocabulary quotion. All of the children in both study groups has received appropriate antiobiotic therapy in a hospital. In the light of these findings, Dr. Sell concludes prevention of meningitis, rather than cure, remains a worthwhile goal.

In Houston an active research is going on concerning metabolic problems and their relation to learning disabilities. Dr. Mary Allen has been searching for enzymatic defects in blood, muscle, skin and fat in children referred with behavioral and learning disorders. She feels if there is a consistent specific enzymatic defect in these four tissues in vivo then there is probably a similar defect in the CSN tissue. This laboratory is working on the premise there is failure to utilize activating substrater, such as vitamins for proper functioning of the enzymatic processes. Dr. Allen is also concerning herself with failure of utilization of glucose thus producing an apparent hypoglycemic state in certain individuals. (Mary Maurice Allen, M.D.,: Personal Communication)

For some time it has been felt cerebral hypoxia occurring pre-natally or at time of delivery can cause brain damage. One set of problems has been how much hypoxia can be sustained, for how long, and when does it have to occur in gestation to produce demonstrable pathologic changes post - natally. Another major problem in the human is how to determine if hypoxia is occurring and when.

Favo and Windle (Favo, M. D., Windle, W. F., 1969) examined the brains of 22 rhesus monkeys 10 months to 8 years 9 months after neonatal asphyxiation of varying times and compared to five non-asphyxiated controls. In addition to primary changes noted from the initial oxygen deprivation insult there were secondary changes present beginning ten months or more after birth of the monkeys. This secondary degeneration was transneuronal and was felt to involve many regions of the brain, but was most clearly seen in the thalamic projection areas of the cortex. The reticular formation was another region showing changes with time. The interesting finding in this study when the authors compared with their own previous work (Windle, W. F., Jacobson, H. N., de Arellano, M. I., and Combs, C. M., 1962) involving studies of brains shortly after asphyxiation of varying times was the lack of damage noted when the

monkeys were deprived for less than 7 minutes; but, on this extended study slight neuronal loss and gliosis were detected in specimens 2 years 5 months to 7 years 11 months old from monkeys also asphyxiated for less than 7 minutes. This adds emphasis to the feeling that birth hypoxia does not have to be so great as to require resusitation for survival to leave its mark on the brain. This would imply that the asphyxiated human infant who may not have required extensive resuscitation at birth may nevertheless be minimally and subtly brain-damaged. What effect this has on intelligence can only be speculative.

Towbin (Towbin, A., 1969) emphasizes the occurrence of two different patterns of cerebral damage from hypoxia depending upon the time of gestation the insult occurs. He has demonstrated that damage is predominately in the deeper areas of the brain such as the basal ganglia and periventricular white matter when oxygen lack occurs between 25 and 35 weeks gestation. In infants near, or at term, the cerebral cortex becomes the target of hypoxic damage. His findings demonstrate the frequent and paradoxical occurrence of cerebral palsy and other forms of neurologic disturbance in infants born with a history of a normal non-cyanotic delivery.

b. Neurological Considerations of Developmental Dyslexia and Related Disorders

Suggestions of the possibility of neurological dysfunctioning appeared in the works of Morgan, Hinshelwood, Rutherford, Ranschburg, and Orton. (Penn, 1966) In 1940 Kirk regarded word-blindness, alexia, and dyslexia as denoting cortical deficiency. (Kirk, 1940) In 1922 Gray stated, "It has been suggested that such cases are due to partial interruptions in the connecting fibers between the primary (apperception) and secondary (memory) brain centers." (William Scott Gray, 1922)

Penn, in a detailed investigation of current medical positions on causes of dyslexia said that current research was concerned with the question of damage to the parietal occipital area of the brain (Penn, 1966) Whitsell reported that Drew in 1956 studied three dyslexics in one family and found "parietal lobe involvement as the anatomic substrate for a disturbance of the Gestalt function." (Whitsell, 1965) On the other hand, Geschwind hazarded to guess that developmental dyslexia, similar to acquired dyslexia, was a result of destruction of the splenium in addition to destruction of the left visual cortex. (Geschwind, 1962) Howes summarized Geschwind's theory.

> The mechanism he proposed attributes word blindness to the joint occurrence of two lesions: one destroying the left visual cortex and the second destroying the splenium and perhaps adjoining white matter of the left occipital cortex. (Davis Howes, 1962).

Custafson and Coursin paraphrased several writers and concluded, "The etiology seems to lie within the neurologic makeup of the child, possibly due to minimal cerebral damage and/or a slow myelinazation of the nerve tract." (Sarah R. Gustafson and David Baird Coursin, 1967)

Many authors recognized neurological dysfunctioning but did not recognize a specific lesion or localization of dysfunctioning.

Hardy recognized central nervous system peculiarities. He considered the defect to be "somewhere in the various reverberatory circuits of the brain." The inadequacies in the feedback circuitry was "an inadequacy in the reinforcing mechanisms which make processing, pattern formation, and retention possible and productive. (Hardy, 1962) Slingerland thought that CNS dysfunctioning prevented "simultaneous perception and integration of sight and sound symbols with their kinesthetic 'feel' in the speech mechanism and the hand." (Seth M. Slingerland) Prechtl found that in dealing with children of nonspecific lesions of the CNS with impaired general performance in reading as a side effect, a choreiform activity lessened ability to fixate and concentrate and also led to a lag in the development of cerebral dominance and delay in the development of reading. Prechtl, (1962). Ellington associated faulty visual perception with neurological immaturity. (Ellingson, 1967)

In summary, the most recent survey of the various etiologies was made by Ajuriaguerra and associates. Basic etiologies currently ascribed to are as follows:

1. . . . peripheric or central physical damage to the nervous system.
2. . . . specific type of disorganization which would follow a disorder of hemispheric dominance.
3. . . . constitutional hereditary disorder.
4. . . . immaturity. (de Ajuriaguerra 1968)

Most neurologists, however, would be reluctant to visualize in developmental dyslexia any focal brain lesion, dysplastic, traumatic or otherwise, despite the analogy of the acquired cases of alexia after brain damage. (Critchley 1964)

They would rather feel as Critchley states that within the heterogeneous community of poor readers (slow readers, retarded readers) there exists a specific syndrome wherein particular difficulty exists in learning the conventional meaning of verbal

symbols, and of associating the sound with symbol in appropriate fashion. Such cases are earmarked, it has been said, by their gravity and their purity. They are "grave" in that the difficulty transcends the more common backwardness in reading, and the prognosis is more serious unless some special steps are taken in educational therapy. They are "pure" in that the victims are free from mental defect, serious primary neurotic traits, and all gross neurological deficits. This syndrome of developmental dyslexia is of constitutional and not of environmental origin, and it is often - perhaps even always - genetically determined. It is unlikely to be the product of damage to the brain at birth, even of a minor degree. It is independent of the factor of intelligence, and consequently it may appear in children of normal I.Q. while standing out conspicuously in those who are in the above-average brackets. There is of course no reason why the syndrome should not at times happen to occur in children of subnormal mentality though diagnosis might then be difficult. Other symbol-systems, e.g. mathematical or musical notation, may or may not be involved as well. The syndrome occurs more often in boys. The difficulty in learning to read is not due to peripheral visual anomalies, but represents a higher level defect - an asymbolia, in other words.

As an asymbolia, the problem in dyslexia lies in the normal "flash" or global identification of a word as a whole, as a symbolic entity. Still further, the dyslexic also experiences a difficulty - though of a lesser degree - in synthesising the word itself out of its component letter-units. Herein lies a two-fold task, comprising first that of interpreting the sound of the word and, secondly, its appropriate meaning. The minor neurological signs of developmental dyslexia as noted by Rabinovitch are (1) disorders of spatial thought; (2) impaired temporal notions; (3) inadequate inconsistent or mixed cerebral dominance; (4) defects of speech or of language; (5) disorders of motility and (6) poor figure-background discrimination. (Critchley, 1964)

II. Genetic Theories of Developmental Dyslexia

Heredity is considered by many authors as possibly the only cause for specific developmental dyslexia. C. J. Thomas in 1905 suggested that the disability was a family trait. (Hermann, 1959) In his 1917 monograph Hinshelwood also favored familial influences as a primary cause. (Critchley, 1964). Dearborn in 1925 studied the findings of earlier writers who had traced family trees and discribed four cases of his own in whom reading disability seemed hereditary. (Vernon, 1957). In 1942 Skygaard published several genealogical tables tracing the family occurrence of dyslexia, thus adding to the evidence. (Critchley, 1964). Hermann cited Hallgren, who in 1950, according to Hermann, firmly established heredity as a major cause of word-blindness. (Hermann, 1959)

However, Vernon said of Hallgren's conclusions that ". . . a primary disability was inherited as a unitary Mendalian dominant characteristic independent of neurotic tendencies . . ." was hard to accept. Instead she asserted that there was "a congenital disposition in certain cases towards the occurrence of related defects. . . ." (Vernon, 1957)

The most current writers affirmed Hallgren's position. Hermann attributed the disability to a specific cause related to the hereditary factor transmitted by dominant inheritance. (Hermann, 1959). However, Critchley stated, "To date no connection has yet been found between dyslexia and chromosomal abberations, as based upon recent techniques of intro-cellular chromosome counting. (Critchley, 1964)

Discussion of the inheritance factor lead to a more specific cause. Myklebust said that the dyslexic "inherits a specific type of deficit in the brain which precludes his being able to learn to read normally." (Myklebust and Johnson, 1962)

In all probability the cases of reading retardation which have been observed after brain traumata at birth are of a nature different from the genuine instances of developmental, i.e. specific, dyslexia. (Critchley, 1964)

The recognition of a difference between specific developmental dyslexia thought to be hereditary and cases of reading retardation caused by brain traumata before, during or after birth is seen in the definition by John Money. Specific dyslexia is a genetic, neurological dysfunction uncomplicated by other factors. (Ellingson, 1967) The delineation of hereditary and acquired reading disability is carried out in the breakdown of the work, The Shadow Children, containing separate sections for the description of dyslexia and minimal brain dysfunction.

III. Other Suggested Causations

1. Cerebral Dominance

Another controversy arose from the theory of lateral or cerebral dominance by Orton. If the dominant side was not developed, directional confusion in reading resulted. (1937) Orton. The same view was found in current literature. Ellingson said that dyslexic children were trying to make both hemispheres do the same amount of work or trying to use both sides of the brain simultaneously. (Ellingson, 1967) However, Critchley pointed out that the relationship between cerebral dominance and dyslexia was complicated by the complexity of

determining handedness, and that correlations had been made on the use of diverse types of poor readers and not on true cases of developmental dyslexia. (Critchley, 1964) Hermann also took issue and considered hemisphere dominance of minor importance in relation to the direction of reading. (Hermann 1959) In reviewing the literature on handedness and cerebral dominance, Zangwill concluded;

> It is difficult to arrive at any very clear-cut decision. If, however, it is agreed that dyslexia presents more frequently among the ill-lateralized, and if lack of definite lateral specialization implies atypical cerebral dominance, it follows that atypical cerebral dominance is characteristic of a fair proportion of backward readers. The dyslexia itself may result from early brain injury, constitutional defect in maturation, or retardation secondary to stress. Indeed, it may well be due to a combination of these factors. (Zangwill, 1962)

Money stated that the problem was not one of left-right dominance. Rather the question was one of confusion "about the direction of the optical image of a symbol in relation to the muscular 'feel' of making it." (Money, 1962) According to Benton, investigations along this line are still open:

> These findings suggest that the ability to discriminate right and left body parts plays a role in the early stages of learning to read and that lack of differentiation of this aspect of the body schema is associated with retardation in learning to read. However, this is not tantamount to saying that disturbances of the body schema play an important role in developmental dyslexia. (Benton 1962)

2. Opthalmological Defects

Developmental dyslexia is independent of errors of refraction; muscle imbalance, and imperfect binocular fusion. (Critchley, 1964) Critchley states this even though authors such as P. A. Witty and D. Kopel (1936) felt that eye dominance resulted in faulty eye movement; H. L. Morse and C. R. Daniels (1959) described a particular defect in the return sweep from the end of one line to start of the next (linear dyslexia). Critchley, Hermann and others view these arguments as "topsy turvey." These pose the issue of poor eye movement as the result rather than the cause of dyslexia.

Campion said, "Refractive error and extra-ocular muscle imbalance have no greater incidence among children with reading disability than among those without reading disability." (George S. Campion, 1965) The Geneva Midoco-Educational Service stated that from a paper by Leservre all children who are non-readers do not suffer from ocular dysfunction and non-lateralization of sight. (de Ajuriaguerra et. al. 1968)

It was reported that dyslexics failed to recognize similar forms as a result of inability to retain the visual impression and slowness of association. "The essential defect in dyslexia seems to be a failure of forms or sounds to achieve meaning." (Critchley, 1964) Benton, on the contrary, stated;

> My conclusion is that deficiency in visual form perception is not an important correlate of developmental dyslexia. By this I mean that, while it may be a determinant of the language disability in some cases, it is not a significant factor in the majority of cases. (Benton, 1962)

In an International Seminar considering the role of the Ophthalmologist in Dyslexia the following position statements were offered:

(1) Not enough objective scientific evidence yet exists to prove that perceptual motor training of the visual system can significantly influence reading disability.

(2) In coping with dyslexia, ophthalmologists should be involved in an inter-disciplinary approach, which ideally consists of an educator, ophthalmologist, pediatrician, and psychologist with available consultation from a neurologist, psychiatrist, reading specialist, audiologist, and social worker.

(3) Eye care should never be treated in isolation when the patient has been referred with a reading problem.

(4) The belief that eye dominance can be at the root of so profound and broad a human problem as reading and learn-disability is both naive, simplistic, and unsupported by scientific data.

(5) Latent strabismus may be associated with a reading disability in certain individuals. This may be treated according to the doctor's own opthalmological principles, but it is significant to the learning problem only in improving reading "comfort or efficiency."

(6) Eye glasses, including bifocals, prescribed specifically for the treatment of dyslexia have not proven effective.

(7) Just how children with reading disabilities should be taught is a technical problem in educational science, which lies outside the competency of the medical profession.

(8) Educational research is needed in the correction and prevention of reading disabilities.

(9) Children with reading disabilities, once diagnosed, should be removed from the milieu where accepted methods of teaching are practiced, in order to give them special instruction along totally different lines.

(10) The percentage of dyslexics within the community has been overestimated by some writers. Others have underestimated the magnitude of the problem. Regardless of the actual figure, reading disabilities among children are grave enough and sufficiently important to justify official recognition.

(11) A national commission should be established to review research presently available and identify specific areas for further work in the scientific as well as the educational area.

3. Cultural Deprivation

In the early consideration of cultural deprivation as a possible cause for learning disabilities stress was placed on the lack of experiences and the deprivation of "things" in the child's environment. Many Headstart programs were planned around the philosophy that if the disadvantaged child was simply given the toys and experiences of the middle class child, the gap in performance noted between the two groups would be closed. To this end Headstart programs provided field trips to airports, government offices, and all sorts of community centers as well as a wealth of material and hardware for the disadvantaged child to learn to manipulate. These programs as noted earlier in this paper have failed to close the gaps seen in the abilities of the disadvantaged or advantaged child.

Still far from total answers to the complexities of cultural deprivation, researchers have more recently worked to investigate the fact that neurological abnormalities are more prevalent in the disadvantaged population and should be considered as a possible cause for this group's learning deficits. Grotberg (1970) cites the infant

studies of Drillien and Pasamanick. "The evidence is clear that there is a higher incidence of birth trauma and premature birth among impoverished families." Though the exact relationship between birth trauma and premature birth and learning disabilities is as yet not directly correlated, enough studies on the learning problems of this population have been done to consider them high risks educationally.

Also according to Grotherg, Brown in his studies has found the disadvantaged child to be likely to be subjected to both nutritional and emotional deficits with resultant learning disabilities. He found and is postulating in his own research, that learning disabilities are produced through changes in bodily function which result from malnutrition.

John Cowley (1966) found that there was an average lag of 8 months between Headstart children and age norms on the Developmental Test of Perception. In the Detroit Test of L. Aptitudes, very low scores were earned in motor speed and auditory attention for both related and unrelated words. Low scores were earned also in visual attention for objects and for letters. Cowley concluded that Headstart children have severe learning disabilities as a result of the developmental lag associated with their impoverished background.

Grotberg (1969), in reviewing Headstart research from 1965 to 1969, found repeated evidence in the studies that Headstart children generally performed below middle-class children on all tests, including those pertinent to identifying children with learning disabilities. The tests measured language, and cognitive, intellectual and achievement behavior, and social-emotional behavior. In another review of research on learning disabilities in disadvantaged children and youth, Grotberg (1965) reported that auditory and visual perception, conceptualization, cognition, vocabulary, and reading were all deficient among impoverished children and youth. However, careful analysis of test items and the use of various tests suggest wide variations on performance of various population subgroups. Clearly we cannot expect all impoverished children to present the same profile of test performance. While some generalized statements are possible, individual differences remain significant. Grotberg suggests that the factors of birth trauma, prematurity and malnutrition and external stresses generated by socioeconomic and ethnic patterns contribute to learning disabilities. She feels that specific programs used to improve the skills of learning disabilitied children are pertinent to the education of the disadvantaged since for whatever etiological reason they evidence the same basic areas of learning deficit.

A preliminary study of 102 subjects, ages 16 to 23 years, who were primarily from minority group ghettos, were examined and tested. Almost all had dropped out of school and had engaged in varying degrees of delinquency. A substantial amount of untreated medical and dental problems were found. On the Wechsler Adult Intelligence Scale, 39 percent had significantly different Verbal and Performance I.Q. scores. The mean grade at which they dropped out of school was 10.5. Fifty-eight percent were reading below the sixth grade level, and 64 percent were below the grade level on the Gates Reading to Understand Directions test. On the Bender Visual-Motor Gestalt test, only one-third were in the normal range. Comparison of the Bender tests with the Oseretsky Test of Motor Proficiency indicated that most of their visual-motor problems were related to visual-motor integration and motor coordination. Comparison of the Bender test with the Closure Flexibility test showed that only a small proportion of the visual-motor problem was related to disturbances of visual perception.

All of the test deficiencies noted are part of the minimal brain dysfunction syndrome which is related to learning disabilities. This cumulative evidence tends to support the hypothesis that a significant degree of minimal brain dysfunction exists in the minority group, delinquent, school dropout population. This evidence may partially explain why the special programs to help educate this population have tended to lack success. A successful program of educational habilitation for the minority poor appears to require diagnostic testing and prescriptive teaching starting in preschool.

Koppelman, Kaplon, and Ganter (May 1969) studied disadvantaged children in Baltimore, Maryland and found the predominant underlying basis for the learning disabilitied proved to be neurological handicap in over 50% of the children studied. Approximately one quarter of the children had significant emotional disturbance as the predominant cause of their inability to learn. They also note that the disadvantaged child population is a particularly high risk population from the aspects of prenatal deprivation, birth injury, nutritional deficit, childhood accident and chronic illness. They state that it is simply not adequate to label the poor achiever in the inner-city classroom as culturally deprived and allow this all inclusive term to explain his poor approach and response to the learning experience. They suggest that optimal medical care to mothers and children may prevent neurological def. rel. to fetal and birth trauma.

Nosography versus Nosology

Etiology is not unimportant and should be the concern of researchers relative to primary prevention. Until, however, it can be demonstrated that every child with a particular developmental aberration expresses similar behavior characteristics or every child who behaves in a specific fashion has undergone a specific developmental aberration, there should be a consideration given to the psychoeducational or behavioral characteristics of a child. The point quite obviously is to identify various behavioral types and provide effective clinical management. The confusions created by employing the concept of "brain damage" or "cerebral dysfunction" to learning disabilities is an illustration of the type of confusion produced by imputing etiology. There has been no verification nor is there eminently likely to be, that children with a specific pattern of behavior did, in fact, have brain damage or that all these children who had been brain damaged possess specific behavioral characteristics. What is apparent is that there are individuals who, according to Birch (1964) "display some primary disorganization, who have developed patterns of behavior in the course of atypical relations with developmental environment, including interpersonal, objective and social features." It would appear, that only by identifying patterns of behavior may the type of remediation be given. Richardson (1966) has indicated: "Possibly now is the time to search more diligently for teaching techniques. It is highly doubtful that we are describing one condition. In fact, when these children are placed in various remedial settings, it becomes apparent that some begin to learn following psychotherapy with remediation, some with psychotherapy alone, some begin to learn when they are given visual motor training, some show marked improvement when they are provided a corrective optical lens and orthoptic training. Some of these youngsters show remarkable improvement with specialized remedial reading such as Fernald or Gillingham methods; some do well with remedial reading after they have received remedial visual-motor training and some seem to outgrow it."

The question must be asked, however, whether we can identify types that have behavioral characteristics and specify type of remediation.

Remediation

Many programs for children with learning disabilities were reviewed before beginning the Perceptual Development Center program and during its three year study. The ideas for remediation in this relatively new teaching field were diverse. They ranged from (1) visual perception training to (2) extensive motor training to (3) strict academic approaches.

Visual Perception Programs

Visual perception programs were suggested to train students to differentiate shapes, to match likeness and differences, to note direction of objects and to discriminate a figure from its background. Such exercises were expected to carry over to directional discrimination and visual discrimination involved in reading.

Money (1962) commenting on visual perception training stated "it is timely to mention that specific dyslexia is one of the group of learning failures that sometimes comes within the purvue of a faddist therapy that is currently enjoying considerable vogue, generally under optometric auspices (Getman 1958). This therapy is derived from a doctrine of the interrelatedness of motor, auditory, linguistic and visual maturation - with particular emphasis on visuomotor or visuopostural relatedness. The fallacy of this faddism is that it takes hypothesis which, quite conceivably, are valid principles of development (Harmon 1958) and applies them, prematurely and untested, as principles of training and treatment, with unjustified reliance on disproved assumptions concerning that old psychological war horse, the transfer of training."

Marks (1969) writes, "Reading is a complex process that requires the integration of a number of abilities of which visual perception is only one. It requires auditory perceptual skills as well as visual perceptual abilities. It calls for communicative abilities (language), cognitive functions (thinking), and a number of motoric and sensory skills. It depends on the development of laterality and sequencing. In order to be able to read, a child must acquire the ability to perceive visually a variety of symbols which are arranged in a temporal sequence. This process calls for attending, discriminating, recalling and intergrating a variety of visual and auditory clues. It is, therefore, quite apparent that visual perception is only one of the modalities through which children learn to read."

He continues that what has not been satisfactorily demonstrated in any study that I have seen is that improvement in perceptual skills by exclusively optometric training methods are automatically translated into increased reading efficiency. One of the most significant, carefully controlled studies would indicate that in normal children time spent in perceptual training is less worthwhile than an equal amount of time spent in reading instruction.

Marks quotes Dr. Richard Masland, formerly Director, National Institute, Neurological Diseases and Blindness, and presently Chief of the Department of Neurology, College of Physicians and Surgeons, Columbia University. The following is an excerpt from Dr. Masland's review:

"In general, learning is very specific. The more closely related to the ultimate task is the learning experience, the more directly beneficial will be the results." Noting earlier in his paper that there should be a multi-disciplinary cooperation between educators, psychologists and physicians, he concludes, "It is true that in many of these children if one searches assiduously, one can find evidence of poorly developed fine motor skills, or an equivocal Babinski or other "soft neurological signs". It is equally true that frequently the clinical psychologist can demonstrate rotations in their Bender-Gestalt drawings or discrepancies between the verbal and performance scores in their WISCS. It is also true that in a playroom setting many of these children seem emotionally immature when compared to their peers. But their treatment is neither neurological, nor psychological; neither is it optometric. For the vast majority of these children, it is educational and best left in the hands of the educators. It is the obligation, the responsibility, the business of the educational establishment to identify these children early and to provide them with the specific educational services that they will need."

Motor Co-ordination Programs

There were basic ideas that motor-coordination was directly correlated to learning and that reading achievement would improve as motor-coordination was improved. Some programs suggested cross patterning and patterning exercises for neurological reorganization. Others provided for general motor skill development which would allow improvement in reading.

The most widely known program of motor-coordination training was the Doman-Delacato System. Some facts concerning the Doman-Delacato Institute have been reported by Freeman and Robins (1967). "The Doman-Delacato Institute operates on the theory that the central nervous system develops in a definite pattern from conception to about the age of eight. Further, progress of this development can be measured by evaluating bodily movements, the child's speech, his manual, visual, hearing and tactile skills."

"They believe that neurologic growth may be retarded by rearing methods, deprivation of necessary stimulation in the child's environment, and that this growth can be completely stopped by brain injury. A child with a learning disability suffers from a disorganization of neurologic growth. His neurologic development can be slowed down by injury to the brain and speeded up by simple, non-surgical methods. By stimulating the development of the central nervous system, the child can be pushed up the ladder of neurologic development."

"Some question the theories, and many question the treatment. There are many questions, e.g., about unproven claims of results of the method and lack of scientific evidence. According to Dr. Roger D. Freeman, psychiatrist at Temple University, the Doman-Delacato method ignores the natural clinical course (in some patients) of brain injuries. While the assumption is that their method treats the brain itself, evidence is lacking that the treatment of "patterning" can stimulate nonfunctioning cells. The method also makes light of the emotional overlay that can certainly exaggerate any neurologic impairment. Also, some of their statements may serve to increase parental anxiety. As a final comment, Dr. Freeman discussed a program involving the Doman-Delacato treatment which included approximately 250 pupils from grades 3 to 9. The treatment was oriented to affect inadequate mobility, poor handwriting, hyperactivity, delayed speech, articulation disorders, stuttering, aphasia, spelling difficulties, and reading problems. However, the results failed to confirm the validity of the philosophy behind the treatment. Also, an earlier study of normal second graders failed to confirm the usefulness of the treatment, a form of physiotherapy first used by Dr. Temple Faye of Philadelphia in the habilitation of cerebral palsy children with significant motor impairment who may benefit from it." (Scholl)

O'Donnell and Eisenson reporting in the Learning Disabilities Journal (September 1969) relate that while positive effects from Delacato training have been suggested by a number of studies (Delacato 1966), subsequent studied (Anderson,1965, Foster,1965, Robbins,1966), did not find significant gains in reading ability after Delacato training. To overcome the limitations they found in the above studies they set up three groups of subjects to receive Delacato recommended training, limited Delacato training and physical education activity. (O'Donnell and Eisenson September 1969)

These specific questions were posed by the researchers:

QUESTIONS	FINDINGS
1. Will the Delacato recommended training or modifications of it make substantial differences in reading ability as measured by the Gray Oral Reading Test?	The mean gain in reading ability as measured by the Gray Oral Reading Test was not significantly different for students receiving the Delacato recommended training, the limited Dalacato training or physical education activity.
2. Will the Delacato recommended training or modifications of it make substantial differences in reading ability as measured by any subtests of the Stanford Diagnostic Reading Test?	The "Treatment Main Effects" did not approach significance at the .05 level on any of the subtests of the Stanford Diagnostic Reading Test.

3. Will the Delacato training or modifications of it make substantial differences in visual-motor integration as measured by the Developmental Test of Visual-Motor Integration?	Pupils receiving the Delacato recommended training or modifications did not make substantially greater gains on visual-motor integration than did pupils receiving ordinary physical education for the same period of time.

There is no convincing evidence that this (measures designed to change eye and hand dominance) benefits reading skills. Similarly, training motor coordination may be desirable in its own right, but it should not be done for the sole purpose of assisting the brain to handle visual symbols. (Reimmuth, 1969)

Academic Programs

Some educators favored the academic approach as seen in reading methods with heavy emphasis on phonics. The methods might have been taught through multi-sensory reinforcement.

One of the forerunners in programs for remediation of reading for dyslexic children was Grace M. Fernald. Her VAKT approach was a whole-word technique. In four stages the child traced words, learned words without tracing, learned from books and then generalized what he had learned. (Kolson and Kaluger 1963) Johnson reported the results of progressive refinement and modification of Fernald's work. Basically, the child learned words as he needed them. Learning word wholes eliminated the dyslexic's difficulty with individual phonemes and graphemes. The child used what he learned orally to continue the sequential development of language which had been blocked through inability to read. The multisensory stimulation which the dyslexic needed was routinized. Through individual attention and uninterrupted work with VAKT, the child's self-concept improved. (Johnson 1966)

Another pioneer interested in education of the dyslexic was Samuel Orton. Based on his theory of failure of normal development of unilateral dominance in the visual language area of the brain, Orton formulated two basic theories for remedial work:

1. Training for simultaneous association of visual, auditory, and kinesthetic language stimuli. . . .

2. Finding such units as the child can use without difficulty in the field of his particular disability and directing training toward developing the process of fusing these smaller units into larger and more complex wholes.

From Orton's two basic principles, Orton and Anna Gillingham developed a step-by-step program which was outlined in a manual for teachers with the help of Bessie Stillman. The Gillingham technique "is based upon the constant

use of association of all of the following: How a letter or word looks, how it sounds, how the speech organs or the hand in writing feel when producing it" (Orton, 1966) Through a phonetic method combined with a multisensory approach involving eight linkages and a set of cards, the child was taught the sounds of phonograms. Later he read stories controlled for sounds. (Kolson and Kaluger, 1963)

Bryant approached remediation through a simplification of tasks so that only one new discrimination or association was presented at a time. He said that the reason some congenital dyslexics never learned discrimination was that several discriminations and associations were involved in one task. His method required about twelve repetitions per task. For example, the vowel sounds would be taken one at a time and practiced until they became automatic. By writing the word; tracing it; copying it on the blackboard, in the air, or on paper; and filling missing letters of a word, Bryant taught details of words. He also provided a cue such as a watch or bracelet for the child to determine his right and left. (Bryant, December (1964)

Another phonics approach was the Stranger-Donohue method. It was taught by the use of letter names and sounds and by the child's tracing over a model of a letter and pronouncing the letter at the same time. After mastering fourteen sets of letters, the child combined the letters into words and later into sentences. (Kolson and Kaluger, 1963)

Other methods followed similar lines. As recorded in Time, Mme. Borel-Maisonny labeled her technique the "gesture and movement" method. She determined the stage of the child and found symbolic representation or gesture to help him over the difficulty. "Can't Read, Can't Spell, "Time Educational Supplement, (April 20, 1962)."

The Hegge-Kirk-Kirk method was a phonic approach utilizing a visual-auditory-kinesthetic-tactile approach in the early stages. After the sounds of the letters were taught through the "grapho-vocal" method, the child began the book Remedial Reading Drills in which he was given controlled practice on the blending of letters into words. (Kelson and Kaluger, 1963).

Critchley suggested several techniques for dealing with dyslexia. He advocated the use of a phonic or analytic-synthetic approach in which there was a slow, gradual progression from simple to more complex tasks. The visual learning was reinforced by other sensory channels. Interesting and exciting reading materials should have been available, and toys incorporating letters and words should have been utilized during an ancillary play-therapy. In the individual and intense teaching situation some subjects were sacrificed from the school curriculum. (Critchley, 1964)

Relatively recent methods were developed outside the United States. The Initial Teaching Alphabet was composed of forty-four symbols in the lower case which represented sounds. Its author , Pitman, tried to eliminate difficulty with the peculiar orthography of the English language. In describing

the i/t/a, Mazurkiewicz suggested the alphabet as a transitional medium for dyslexics when beginning to learn to read. After the child had acquired fluency and confidence, he was to transfer to traditional orthography and spelling. (Mazurkiewicz, Schiffman 1966)

Gattegno and Hirman explained Words in Color and the present status of its use in the United States. Current research placed emphasis on spatial factors but ignored the temporal aspect of reading. "Inner criteria must be generated which reliably relate spatial factors to temporal factor." (Hirman, 1966) Establishing the inner criteria was accomplished through the use of color for letters introduced. Visual dictation in which the teacher touched signs or vowels in various colors with a pointer and a consonant in another color was a major aspect of training. Words were gradually built through Visual Dictation. Wall charts were later used for transformation from Visual Dictation to words and words in sentences. (Gattegno and Hirman, 1966)

Similar to Words in Color was the Color Phonics System. Bannatyne based his system on that of Edith Norrie of the Wordblind Institute of Copenhagen.

> The Color Phonics System is a set of individual letters and letter combinations printed on small cards, the letters being color coded in such a way that once the principle of coding has been learned the child can immediately identify each sound. Key word and illustrated objects are printed on the reverse side of the cards to provide additional cues. (Alex D. Bannatyne, 1966)

There were five stages in the teaching program, the end of which the child reached a reading age of nine years. The child was encouraged to read independently and to write creatively. (Bannatyne, 1966).

Another recent method, as reported by Edwards, was developed by Dr. Myron Woolman, Woolman combined "certain aspects of programmed instruction with the so-called linguistics approach to reading." (Edwards, 1966) The method had three cycles, beginning with single letters, combinations of letters and combinations of letters into words. In Cycle I only capital letters were used. In Cycle II lower case letters were introduced and more complex selections were presented for reading. Cycle III presented inconsistencies in the English writing system. All work was combined with VAKT. Motivation and reward were emphasized. (Edwards, 1966)

The Eclectic Approach

An eclectic approach including several academic procedures and/or motor coordination and visual perceptual programs was often recommended.

The eclectic approach was probably the more prevalent method of instruction in the few public and private schools where remediation was being attempted in 1967. A large battery of tests were given by a highly-trained

staff to determine the student's abilities in every area they considered pertinent in the evaluation. Medical and neurological evaluations were extensive. After this testing was completed and evaluated a program was then set up for each student to strengthen the areas in which he was weak.

It was the view of the project director that selection of a remedial program must relate to:

1. Ease and cost of administration in terms of specialists, equipment, and space

2. The relation of the remedial program to ongoing school programs

3. The capacity to objectify the results of intervention.

Section III Procedures

A. Considerations in Program Selection

The project director in making a final decision on the program model was guided by the philosophy which she accepted concerning the nature of dyslexia. This philosophy was that specific developmental dyslexia was a neurological dysfunction and that there was strong evidence that this dysfunction was hereditary. Further that there were related disorders to the specific reading dysfunction, which were probably not of a hereditary nature but bore some of the symptomatology of dyslexia and included other characteristics as well.

It was accepted that approximately 10-20% of the school population suffered from dyslexia and related disorders and it was the hope of the director to provide a meaningful program for the school children of Natchez, not just a few classes for a small selected group. The need in Natchez was for specialized instruction for dyslexic students which would utilize specific material for remediation in an individualized presentation.

This remediation should be as rapid as possible so that these students could return full-time to regular classes. This program also had to be economically feasible for a public school operation.

Previous investigation had indicated that while there were many books and articles on the definition, etiology, and diagnosis of dyslexia there were few which dealt with clinical management. Of those reported, the only one which dealt with the age and grade range to be included in the Natchez program was that developed at the Reading Research Institute at Berea College and the Reading Disability Center and Clinic at the University of Alabama Medical College. This work covered the age and grade range indicated and appeared to have the greatest application to a public school setting of any considered.

Since the primary aims of the Natchez Perceptual Development Center were evaluation, remediation, and dissemination of information regarding dyslexia, the goals formulated for the Berea and Alabama operations were tentatively accepted. These were: 1) the understanding of the nature of dyslexia; and 2) the development of effective remedial procedures. Relative to the second goal were: a) the development and utilization of procedures which might be used by para-educational personnel as instructors under supervision; b) the development of programs which might reduce treatment time; c) the development of programs which might be incorporated into ongoing school operations; and d) the development of economically feasible programs.

Since the aims and procedures of the Reading Disability Center and The Reading Research Institute were accepted as guiding but not binding structures, these should be dealt with in some detail.

Alabama and Kentucky Studies

According to Shedd, some 65% of the students in the public schools learn to read smoothly and effectively without giving it a second thought. Some 35%

of the school population do not attain a sufficient degree of reading skill to maintain learning in all areas.

Shedd, Professor of Psychology, Department of Psychiatry, Director of the Reading Disability Center and Clinic, the University of Alabama Medical College, Birmingham, Alabama and Director, Reading Research Institute, Berea College, Berea, Kentucky, cites several major reasons for this failure. A reading problem might be caused by educational deprivation. Some students are absent or move about a great deal in the early grades and so simply miss basic skills they should master. A second cause for reading failure might be cultural deprivation. Where there has been a dearth of communication in the early years and where there has been no reading and story telling, students may be slower in gaining the abstract skills of decoding and encoding. A third reason for lack of reading facility is mental retardation. The student simply does not have the intellectual potential for learning reading skills as rapidly as the normal youngster. A fourth reason is frank brain damage. In these students neurological examinations clearly show focal impairment which hampers educational development. A fifth reason for learning failure is lack of vision or sight or some other severe sensory problem. A sixth reason for learning disabilities is a primary emotional problem which causes a variety of educational difficulties. A seventh reason for reading failure is dyslexia, a specific perceptual-motor disability, and related disorders. Shedd indicates that minimally 40 % of reading failures are due to dyslexia and related disorders (hyperkinesis).

Dyslexia, he states, is thought by many to be genetic in nature. Twin studies by Edith Norrie show that in identical twins there is 100% concordance of the problem. The concordance for fraternal twins is 30%, and for siblings is 17-20%. Familial occurrences of dyslexia are recognized. Dyslexia is seen in males more frequently than females, in an approximate ratio of 7-1. Dyslexics have difficulty primarily in reading, writing and spelling.

Hyperkinesis might be characterized as hyperactivity present since the earliest years of life and occurring in the absense of major central nervous system disorder or childhood psychosis (Bakwin and Bakwin, 1966, p. 351-353). In addition to hyperactivity, there are characteristic defects or attention, excitability, neurologic abnormality, learning disability, emotional disorders, physical disabilities and speech difficulties. These characteristics appear to be genetically related in one-third of the cases. They are seen more frequently in males than females (Wherry, 1968 indicates a 9 to 1 ratio). The hyperactivity diminishes with age (Bakwin and Bakwin, 1966, Eisenberg 1966, Huessey 1967, Wherry 1968, Paine 1968).

Thus, the work of Shedd (1967) provided an operational characterization of dyslexia and related disorders. He says "(These) may be defined as the failure to develop specific perceptual-motor skills to expected proficiency independent of instruction, motivation, sense organ functioning, intelligence and CNS damage." The specificity of the'arrestation of anticipated development' was noted in the discrepancy between achievement in certain activities

as compared to achievement in other activities."

Shedd summarizes these characteristics for dyslexia and hyperkinesis as follows:

1. Spotty performance on IQ tests, achievement high in some areas, low in others. This may be illustrated by the WISC;
   Dyslexia-There is poor performance on digit span, arithmetic, coding and picture arrangement subtests when compared to the vocabulary subtest.
   Hyperkinesis-There is poor performance on digit span, arithmetic, object assembly and block design subtests when compared to the vocabulary subtest, temporary inefficiency and impairment in vocabulary, information, comprehension and similarities.

2. Below mental age on tests of drawing a person. Employing a Goodenough-Harris scoring procedure for DAM it is found that for:
   Dyslexia-There is a 10-20 point difference between WISC full scale IQ and DAM IQ. Qualitatively the drawings are lacking in detail.
   Hyperkinesis-There is a 20 or more point discrepancy between the WISC full scale IQ and DAM. Qualitatively the drawings are lacking in detail, are "open" or bizarre and frequently fragmented. Poor co-ordination is expressed in failure to join lines and marked variation in tension.

3. Poor performance on visual-motor Gestalt tests for age and indicated intelligence. If the Berea Gestalt Test is employed, for example, it is found that for:
   Dyslexia-An error score of 9 to 15 is diagnostic. There are frequent error scores of rotation, failure in internal detail and distortion.
   Hyperkinesis-An error score of 16 or more is diagnostic. There are frequent error scores of rotation, failure in internal detail, distortion, destruction, addition and reduction of sides and angles.

4. Poor performance on group tests which require reading and writing. Dyslexia scores are frequently higher in arithmetic and comprehension than on those that require specific language skills.
   Hyperkinesis-There is temporary inefficiency or, poor performance in all areas.

5. Impaired temporal orientation.
   Dyslexia-There is a marked difficulty in estimating temporal intervals.
   Hyperkinesis-There is a temporary inefficiency or impairment in estimating temporal intervals.

6. Impaired right-left discrimination. The Right Left Discrimination Test developed by Shedd and Drake (1961) indicates that when error scores are greater than 19 there is an indication of specific learning disability (dyslexia and hyperkinesis).
7. Poor spatial orientation.

Dyslexia-There is poor utilization of allocated space.
Hyperkinesis-There is poor utilization of allocated space, with frequent overlappings and edgings.

8. Field dependent perception.
Dyslexia-There is a characteristic response to total field characteristics-figure-ground.
Hyperkinesis-There is temporary inefficiency in focusing on the figure.

9. Frequent perceptual reversals in reading and writing numbers beyond age and instructional level. These are characteristic of both dyslexia and hyperkinesis.

10. Impaired reproduction of rhythmic pattern.
Dyslexia-There is a marked disability.
Hyperkinesis-There is a temporary inefficiency.

11. Impaired reproduction of tonal pattern.
Dyslexia-There is a marked disability.
Hyperkinesis-There is a temporary inefficiency.

12. Impaired auditory discrimination.
Dyslexia-There is a marked disability.
Hyperkinesis-There is a temporary inefficiency.

13. Speech irregularities.
Dyslexia-There is a frequent mild irregularity marked by slurring, repetitions, hesitations, and incomplete sentences.
Hyperkinesis-There is marked difficulty expressed as articulatory and motor difficulties, monotony, delayed speech development, grammatical difficulties, vowel stop problems.

14. Impaired coordination.
Dyslexia-There is a non-specific motor awkardness.
Hyperkinesis-There are marked gross motor problems.

15. Impaired fine motor skills.
Dyslexia-There is an aperiodic loss of fine motor skills.
Hyperkinesis-There is a marked chronic reduction of fine motor skills.

16. Reading disabilities.
Dyslexia-There is a primary problem of decoding with comprehension difficulties arising only as a consequence of lack of vocabulary development.
Hyperkinesis-There are primary problems of decoding and comprehension.

17. Spelling difficulties.
Dyslexia-There is a marked reduction of spelling ability.
Hyperkinesis-There is a temporary inefficiency. When there has

been systematic instruction, this may be the most adequate skill.

18. Writing disabilities.
Dyslexia-There is mild dysgraphia.
Hyperkinesis-There is marked dysgraphia.

19. Variability in performance.
This is marked in both,but more erratic in hyperkinesis.

20. Poor ability to organize work.
This is marked in both, but more erratic in hyperkinesis.

21. Slowness in finishing work.
This is marked in both, but more erratic in hyperkinesis.

22. Short attention span for age.
This is marked in both, but more erratic in hyperkinesis.

23. Impaired concentration ability.
This is marked in both, but more erratic for hyperkinesis.
Hyperactivity of the dyslexic is task related and induced by the dyslexic while it is stimulus related for the hyperkinetic.

All these characteristics must be present or there must be evidence that they were present prior to remediation; before a diagnosis of dyslexia or hyperkinesis can be given. The existence of the characteristics in contiguity is terribly important, for some of the characteristics relate to other diagnostic entities and may even be present in a normal person. The accumulated weight of various signs and symptoms are employed in making a diagnosis. These must be evaluated carefully against a background of environmental and interpersonal determinants.

The following tests were administered to evaluate items 1, 2, 3, 6, 8, 13, 16, 17:

Wechsler Intelligence Scale for children, Goodenough-Harris Draw-A-Man Test, Right-Left Discrimination Test, Johnson Handwriting Test, Berea Gestalt Test, Gilmore Oral Reading Test.

In addition, characteristics numbered 4, 5, 9, 10-12, 14, 15, 19-23 as listed above were appraised by observation during the testing period, and from reports of teachers and parents, academic records and parent interview. All these characteristics had to be present, as indicated, before a diagnosis of specific learning disability was rendered.

Shedd (1969) presented data concerning 32 educationally deficient, 135 dyslexics, 115 hyperkinetics, and 45 IQ below 90 subjects relating to prenatal and natal difficulties. The 327 children were drawn from three states-Alabama, Indiana, and North Carolina. The data derived from parental retrospection and was consistent across categories (there is no evidence to believe that a

mother of one type of child is more or less honest or dishonest than another type). These data are presented below:

Percentage of Educationally Deficient, Dyslexics, Hyperkinetics, and Low IQ's with Prenatal and Natal Difficulties.

	Educationally Deficients (N-32)	Dyslexics (N-135)	Hyperkinetics (N-115)	IQ's Below 90 (N-45)
Poor health	3.0	6.4	12.0	12.0
Carrying child to term	15.0	14.4	27.0	3.0
Illness	6.0	22.4	18.0	24.0
Accident	0	3.2	3.0	3.0
Prolonged labor	9.0	22.4	3.0	21.0
Precipitious labor	21.0	32.0	30.0	15.0
High forceps used	12.0	32.0	32.5	72.0
Caesarian birth	6.0	17.4	32.5	0
Breech presentation	3.0	6.4	6.0	0
Child discolored at birth	12.0	12.4	7.5	18.0

It may be seen that the mother's health may be more involved with hyperkinesis and low IQ's than in normals or dyslexics. There is greater difficulty in carrying the child to term for hyperkinetics than other categories. All categories of behavioral disorders have a higher incidence of illness during pregnancy than educationally deficient children. The category of accidents during pregnancy is not different for any of the categories. Labor was reported as being prolonged for dyslexics and low IQ's. High forceps were used significantly more frequently in hyperkinetic and low IQ cases than in educationally deficient and dyslexics. It may be noted that Caesarian births are more frequent for hyperkinetics than any other category. It may be concluded that while such information is important, in and of itself, it is not diagnostic. Quite apparently, while difficulty during pregancy and at birth may be related to behavioral variation, it is not causally related to type of behavior.

Data concerning behavioral variation for each category may be seen in the following item analysis. It may be seen that there are important differences in some areas between the categories.

	Dyslexics	Hyperkinetics	Educationally Deficient	IQ Below 90
1. Has the child been knocked unconscious?	4.5	2.7	0	4.8
2. Has the child had convulsions?	1.8	6.0	0	8.8
3. Has the child ever had extremely high fevers for prolonged periods?	5.4	6.5	0	28.6
4. Is there any history of epilepsy in either family?	4.0	4.5	4.0	8.8
5. Did the child suffer from enuresis?	1.4	16.2	28.0	11.0
6. Does the child drool?	3.8	5.5	0	0
7. Does the child suck his thumb?	10.3	9.2	12.0	6.6
8. Does the child bite his nails?	31.5	11.0	32.0	41.0
9. Does the child have peculiar food habits?	3.9	25.5	12.0	15.4
10. Is the child finicky?	21.0	40.2	12.0	30.8
11. If allowed would he take in a great quantity of sugar?	36.5	32.0	36.0	50.6
12. If allowed would he drink a great deal of milk?	35.0	24.2	24.0	35.2
13. Does the child have known allergies?	38.6	34.2	20.0	19.8
14. Does the child seem clumsy?	35.3	12.5	16.0	59.4
15. Does the child have any tics or grimaces?	4.5	12.5	4.0	8.8

		Dyslexics	Hyperkinetics	Educationally Deficient	IQ Below 90
16.	Is the child hyperactive?	42.7	50.0	16.0	46.2
17.	Is the child partially sighted?	8.5	5.0	4.0	6.6
18.	Did or does the child wear glasses?	19.2	15.5	16.0	22.0
19.	Did the child ever have a fusion problem?	5.7	6.2	8.0	17.6
20.	Does the child have a hearing loss?	5.4	4.0	0	4.4
21.	Does the child have difficulty discriminating sounds?	21.9	23.0	12.0	35.2
22.	Was the child's speech difficult to understand?	15.3	23.0	20.0	39.6
23.	Does the child stutter?	3.0	5.8	0	13.2
24.	Does the child have difficulty in saying certain words?	33.2	35.8	32.0	66.0
25.	Can the child understand what is said to him?	88.3	79.2	92.0	66.0
26.	Is the child accused of not paying attention or daydreaming?	60.2	69.7	52.0	88.0
27.	Has the child ever had any speech problems?	18.3	20.0	24.0	35.0
28.	Does the child have musical ability?	29.0	18.5	32.0	35.2

	Dyslexics	Hyperkinetics	Educationally Deficient	IQ Below 90
29. Does the child show unselective often excessive displays of affections?	22.6	25.5	16.0	41.8
30. Does the child show better judgment when playmates are limited to one or two?	40.0	49.2	36.0	52.6
31. Does the child get along better with younger children?	32.5	41.2	16.0	63.8
32. Does the child get along better with older children?	27.8	19.2	24.0	30.8
33. Is the child overpowering in relation to children in his play group?	18.0	25.0	4.0	33.0
34. Has the child been in frequent difficulties with school or other authorities?	6.9	10.7	8.0	19.8
35. Does the child have temper tantrums when crossed?	20.4	25.0	16.0	46.2
36. Is the child taken advantage of by other children?	25.9	33.0	8.0	46.2
37. Has the child been described as immature?	60.3	55.7	24.0	68.4
38. Is the child easily distracted?	66.8	76.2	40.0	90.2
39. Is the child explosive in relations to frustrating situations?	45.3	43.7	36.0	55.0

	Dyslexics	Hyperkinetics	Educationally Deficient	IQ Below 90
40. Does the child become upset easily?	47.0	49.7	32.0	68.2
41. Would you describe the child as impulsive?	36.8	47.0	36.0	46.2
42. Does the child become over-excitable in play with other children?	25.8	22.7	36.0	30.8
43. Does the child display poor judgment when in a group?	22.8	26.5	20.0	37.4
44. Does the child need to cling, to touch, or to hold onto others?	14.9	24.0	12.0	24.6
45. Does the child child cry easily?	33.0	44.5	28.0	50.6
46. Does the child pout?	27.5	33.0	36.0	50.6
47. Does the child do well in mathematics?	45.2	36.2	56.0	22.0
48. Does the child show variability in school performance?	67.4	59.0	70.0	55.0
49. Does the child demonstrate poor organizing ability?	64.4	52.5	56.0	66.0
50. Have you or the teacher noticed slowness in finishing work?	80.2	70.5	52.0	88.0
51. Has it been considered that he is an underachiever?	65.8	52.0	64.6	74.8

	Dyslexics	Hyperkinetics	Educationally Deficient	IQ Below 90
52. Has the child been retained in a grade or grades?	32.9	24.0	0	63.8
53. Has the child been socially promoted?	21.6	15.8	12.0	26.4
54. Has the child had tutorial help in language skills?	51.1	20.7	24.0	33.0
55. Has the child received special help in the schools?	37.5	16.7	24.0	35.2

From the item analysis it may be observed that children with psychoneurological problems (dyslexics and hyperkinetics) differ from educationally deficients relative to: being knocked unconscious, having convulsions, childhood drooling, finicky appetite, allergies, hyperactivity, difficulty with intelligible speech, stuttering, inattention, musical ability, inappropriate affection, poor play group judgment, older or younger playmates, overpowering play group relationships, temper tantrums, being taken advantage of by other children, being described as immature, easily distractible, explosiveness, slowness in finishing work, being retained in grades, receiving social promotion, obtaining tutorial help.

It may be noted that psychoneurologically impaired children generally have higher scores on physiologically related disorders than educationally deficient children. In relation to emotionally related areas, however, the converse might be noticed. Such instances are: enuresis, thumb sucking, nail biting, speech problems, overexcitability in play, pouting. Here educationally deficient children exceed psychoneurological ones but not low IQ ones.

When parents were queried concerning childhood development, it was learned that both hyperkinetics and dyslexics generally were weaned and learned to walk within a normal range. Hyperkinetics learned to talk later than normals, were recognized early by parents as having sleep disturbances, difficulty with bowel and bladder trouble and enuresis.

These definitions and characteristics are in agreement with current neurological data concerning dyslexia and related disorders as seen in the previous investigation.

Clinical Management

Shedd also offered a program of clinical management for dyslexics and children with related disorders. Prior to compiling his significant program to teach reading, writing, and spelling to students with specific perceptual motor disabilities, Shedd reviewed the needs of students with specific reading disabilities and the existing models for clinical management. In the March 1968 Journal of Learning Disabilities he reported his research. The following reproduces a large segment of that article:

> "Rabinovitch (1959) indicated the nature and process of remediation in terms of presently existing models and procedures. He says: "Retraining is slow and unsteady, ultimate results are less favorable (than those who display secondary reading difficulties). Learning needs constant reinforcement, and numerous approaches - visual, auditory, kinesthetic - have to be introduced. . . . Training in directional orientation, visual memory, phonic recognition, and other techniques is called for. There tends to be little carry over from day-to-day, and patients are often discouraged by their slow uneven progress. Crucial to the treatment is the relationship with the remedial therapist who must have infinite patience and ingenuity. At the present time many adolescents with primary retardation leading to illiteracy may, with remedial therapy extending

over several years, achieve a fourth or fifth grade level of competence, although some may advance further."

The following are contained in this statement: the necessity of private tutorial help, a highly trained therapist, specially prepared materials, instruction in each area of difficulty, long term treatment, poor to moderate success. If this is the case, the possibility of helping many dyslexics is an impossibility, for there are few training programs for tutors, only a few could qualify as highly trained, there are few especially prepared materials, techniques for dealing with some of the characteristics are uncertain, the cost in terms of time and money are prohibitively high and the results in terms of effort are negligible.

Existing Models for Clinical Management

There is no immediate help in solving these problems by referral to ongoing systems. Supposedly specialized information, which presents a catalogue of possible activities for dyslexic children, is of little value even to the highly trained specialist, for it merely presents possible ideas which might be effective after the reader develops and experiments with them.

Models and procedures developed by psychologists are of little help, for they have traditionally pursued the study of verbal learning by means of nonsense syllables and the like, i.e., non-meaningful material. This must be the case if the learning process independent of unknowable subject experience is to be understood. Most often, however, these studies utilized "normal" adults or, more specifically, college students. Educators have rightly found little in this work that is relevant to the classroom. The result has been, according to Eleanor Gibson, "two cultures, the pure scientists in the laboratory and the practical teachers ignorant of the progress that has been made in the theory of human learning and in methods for studying it."

Gibson's statement is more than a trifle strong, for it suggests that there are experimental procedures applicable to the classroom which, if followed, will provide the desired information. It further suggests that the "pure scientists" are aware of the problems of "practical teachers" and conduct research aimed at these problems.

It is unfortunate that educational research has centered largely around fads supported by slogans. Perhaps the most damning has been the notion or the myth that educational procedures and methods might be investigated scientifically. That such is a myth is due to two sources of variation, teacher and student, which prevent assignment of error. Since in education we are concerned with the application of a method by a teacher to students, we must be concerned with teacher characteristics and student characteristics. Unfortunately, neither teachers or students may be standardized or controlled while methods are varied. Regardless of the efforts to counteract these deficits, those who wish to doubt can doubt. A simple cross over design may be employed with rats in which

each subject serves as his own control for different treatments. Even here, however, previous experience or "set" of the rat and of the experimenter may make a critical difference. Employing teachers who are supposedly dedicated to a particular method and assigning students randomly errs in failing to appreciate depth and nature of "dedication" and the relation to specific method. The only precaution is scientific attitude and, when faced with a series of college courses derived from the "true" philosophy which aims at complete monopoly and a barrage of commercial interests that want to place several books in every child's hand, this is extremely difficult. Fads, purportedly based on empirical verification, which have permeated reading instruction have been "whole word," emphasis on context and pictures for meaning, the "flash" method, speed reading, revised alphabets, colored words, the return to phonics. The method is touted as a panacea, and the failure to profit from it is generally conceived to be a gross abnormality on the part of the teacher or the student. This is usually expressed as an aberration on the part of the child as a consequence of too much or too little pressure at home, or the teacher failing to meet his needs and to interest and motivate him.

The first of those could most effectively be handled by "tender love and care" or psychotherapy. This approach is generally supported by a case history which ends with a testimonial on the part of the reporter that everyone concerned - teacher, parent and child - are now happy and that the child likes to read.

Schiffman (1966) says: "The actual value of therapy in conjunction with remedial assistance is still under question." The research that has been published so far is quite controversial and varied. Arthur (1940) gave a number of examples of children with severe reading problems who were helped by psychiatric treatment enabling them to improve their reading levels. Axline (1947) and Lecky (1945) have postulated that poor reading may result from inconsistencies in the attitudinal system of a child, or from difficulty in resolving a conflict between a concept of self as a poor reader and a concept of self as a good reader. A study by Bills (1950) using non-directive play therapy with a group of retarded readers suggests that significant gains in reading may be accomplished by therapy alone. In 1961 a study was conducted in Baltimore County to test the value of remedial reading and psychotherapy in the public school system. One group received remedial reading and psychotherapy; one group received psychotherapy only; one group received remedial reading only; and the fourth received no treatment. Schiffman reports: "The experiment showed a positive effect in favor of remedial reading as a treatment; yet shows no consistent effect due to psychotherapy."

If a wish to hold that psychotherapy is critical is desired, an argument could ensue that the proper type of therapy was not employed, or that the therapists were not competent, or that some subtle bias operated in the assignment of the students to treatment groups, or that the parents of the children receiving psychotherapy influenced a negative effect, or that the children felt isolated, and so ad infinitum.

In reading most of the reports relating reading difficulties to personality disturbances, the apparent reluctance to use any statistical tests is noted. There is entirely too much dependence, even when psychometrics are employed, upon clinical intuition, feel, etc. Despite this difficulty, it is apparent that some types of personality disturbances are the direct and immediate causes of reading disability, some cases of reading disability lead to personality disturbances, therapy is valuable in certain cases and has a legitimate place in the treatment of some disability cases. It is hard to agree, however, that we can approach reading problems as necessarily consequential to emotional problems even if by so doing we can maintain absolute faith in functionalism.

Silver (1967) suggests that appeals to interest and motive are equally questionable. He says: "This approach begins by asking the child what he is interested in and then locating that one book, brightly colored, new and shiny - about spacemen, cowboys, or pro football. The tutor prepares challenging discussion questions beforehand and the lesson starts with optimism. If the child has a specific language disability, perceptual and associative problems will soon appear. Because no provision has been made for these aspects of the reading process, the youngster will plod through his bright and interesting book, calling saw was, puzzling over b and d, forgetting the phonemes for the graphemes v and h, missing lines on return sweeps. The tutor will work harder and harder trying to give contextual cues. Finally, he will give up and merely 'tell' the boy the words he doesn't know. He may decide to 'read aloud' to give the pupil practice with 'oral language' or he may discard the book for one of the commercial games to 'build rapport'. As can be imagined, the prognosis is guarded if there is intervention in this fashion with a specific language disability." Silver reviewed other methods and found them equally unsuited: the Initial Teaching Alphabet ignored perception and meaning, study skill programs ignored the disability found in dyslexia; programmed instruction in the form of workbooks, drill pads or kits did not deal with the basic defects of dyslexia. He, as others, concluded that the usual models of education have little applicability to dyslexia.

Two approaches remain, in terms of our present knowledge, which may be considered in the education of the dyslexiac. Both of these are clinically oriented, make provision for diagnostic study, and are aware of perceptual defects; one is the multisensory approach, and the other the intact channels approach.

Because a method has been around for a long time it certainly does not indicate its efficacy, but it demands some consideration. The technique for total language instruction which has the longest and, perhaps, the noblest history is the multisensory one. Protagoras was the first to call attention to the use of vision, audition, kinesthesis, and taction. He was followed by Seneca, Quintilian, St. Jerome, Charlemagne, Locke, and others. In the early nineteen hundreds, Grace Fernald and Helen Keller (1921) developed a method for treating individuals who are grossly handicapped. The basic characteristic of the method was its dependence

upon kinesthesis. The technique was not recommended for any group of retarded individuals and was only suggested for certain children.

The technique came under the criticism of Gates (1927). He asked if such a method was essential to the acquisition of words and larger units. He did not ask, however, if such a method was necessary for a specific group of retarded readers. Assuming little or no variation in the natural endowment of all children, he set about answering his question. He undertook a series of carefully controlled experiments in which deaf children were employed as subjects. He demonstrated that the deaf could learn to read without "basic" kinesthetic-oral devises. These and other experiments in which there was incidental kinesthetic learning purportedly questioned the validity of the method and it was soon abandoned as a remedial device.

Critics could not, however, deny the success of such procedures and attempted to explain this by saying that it was the rapport which developed between the student and the teacher rather than the method qua method. This became a marvelous model for criticism and is still invoked by Deweyites. Another criticism which has become standard fare is to point out that methods studies are inconclusive because they do not employ other remedial methods with comparable groups of children. At first glance, this seems reasonable until it is related to the criticism stated, the therapeutic and remedial value irrespective of method inherent in the attention given by the clinician or teacher to the retarded reader. An experiment would have to consist of methods a b c . . n and no method. No method might be arranged if a statistical group might be employed, i.e., if a group were tested at the beginning and at the end and employed as a control, but by so doing they would be without the attention of the tutor or teacher. Another activity group, such as a play group or a camp group, would not suffice, since they would have a different interactional pattern. Quite simply there is no tutorial placebo. If an experimenter follows the popular line in educational investigation, the criticisms are not applied. If, however, he takes a divergent view, we hear the same cries which take on credence for the uninitiated because of reliability. It might be noted that exactly the same criticisms might be leveled against those who level their criticism. Truly, since it cannot be handled in an effective fashion and since it is present to a greater or lesser degree in every educational situation, it might as well be ignored.

The "intact channels" approach attempts to identify the individual's intact perceptual channels and to choose a teaching procedure which exploits these, e.g., to teach phonics to children with good auditory discrimination, or to teach a sight approach to children who are good visualizers.

Silver and his co-workers (1967) employed this procedure with dyslexic children. Re-evaluating the work 10 and 12 years later led them to doubt the overall effectiveness of this procedure.

Both the multisensory approach and the intact channels approach have

led to a re-examination of whether perceptual ability is general or specific as related to reading ability.

Gates (1922) could find no evidence that poor readers differed from good readers in respect to visual discrimination of nonlinguistic material. He went further and denied that visual perception or memory, as such, could be responsible for reading disabilities. He saw perception composed of abilities to perceive words, digits, geometric figures, etc.; each of these being relatively independent of other perceptual abilities. Should there be a discrepancy between one type of perception and another it was apparently due to poor educational methods, unfavorable home influences, emotional factors, and visual defects.

Orton (1937) saw a specific type of language disability as springing from visual language dysfunction rather than from a visual perceptual dysfunction generally. He says: "Functions other than reading but which incorporate a visual element are entirely normal. For example, visuomotor coordination may be excellent. . . . Visual recognition of objects, places, and persons is quite normal, and interpretation of pictorial and diagrammatic material is frequently very good."

One of the most enticing of the simplistic doctorines is that proposed by Olson (1942, 1959). Beginning with a "growth philosophy" we are assured that reading is an individual matter, that all children cannot be expected to achieve alike, and that reading is rooted in biology as well as in psychology and education. Achievement is conceived as being function of the organism as a whole. Those children who are able to develop all functions together are best able to perform educational tasks. Split-growers who show a pattern of split growth in which the various attributes fan out and cover a wide band often adjust poorly at school. Such a "growth philosophy" minimizes, if not denies, reading retardation. Reading, we are led to believe, is related to organismic growth, and the retarded reader (?) is simply a child who has not yet achieved the level of reading readiness that adults expect of him. We are assured that, left alone, most children will eventually read up to their proper level. Proper, in this instance, is determined by intelligence level. Discrepancies in perceptual ability, as reported by Gates and others, are more apparent than real and with continuous functioning will disappear.

This view is presented by Benton (1966): "A certain level of visual discriminative capacity is a necessary precondition for learning to read, and there is variation in the rate of development of these visuo-perceptive skills in the early years of life. Significantly, retardation in development which extends into early school years will then necessarily entail a corresponding retardation in learning to read; hence, a relationship between the two sets of skills in younger school children will be discernible. But as retardation in the level of visual perception is overcome by the child, his reading level should improve accordingly, at least under favorable circumstances."

If there is no corresponding similar increase in reading skill with a visual perceptive skill, then a deus ex machina of intelligence is invoked. In this regard Benton says: ". . . a good many students . , . have not exercised a sufficiently precise control of the factor of general intelligence to provide valid information about the specific or 'pure' relationship between higher-level visual form perception and reading ability. Since these higher-level perceptual skills are correlated with intelligence (indeed they often enter into its very definition), an at least broad matching of groups on this global variable is a necessity."

There is certainly no evidence to deny that form perception is continuous from elemental to complex; breaking it down into two types, lower level and higher level, and then relating the lower level to organismic processes of maturation and the higher level to intelligence is evading the issue. It is permissible to include visual perceptual ability in an operational definition of intelligence should we wish to do so, but it should be and is continuous. In other words, the visual perceptual items which appear on the intelligence tests at lower age levels must receive the same interpretation that they receive at upper age levels. We cannot interpret them as "split-growth" at one age and retardation at another. Evidence that an adequate level of perceptual functioning is attained with continuous functioning, and that at a certain point there is no longer any variation, is based upon a visual perceptual test developed by Benton. Failure to extend the test in terms of difficulty excludes possible variation at advanced levels of development. Such a procedure assumes that there is a minimal visual perceptive ability which underlies reading. It may be possible that there is a perceptual process which has a history and which relates to a conceptual process; a minimal development may be required in the perceptual sphere before conceptualization is possible, but development in the conceptual sphere is intimately related to development in the perceptual sphere.

The point of view accepted has a determing influence upon remediation, the specific view demands remediation in terms of a specific disability and the general view makes remediation unnecessary. Silver's conclusion that ". . . it was the adequate reader who showed the greatest improvement in perception while it was the inadequate readers in whom perceptual problems persisted" indicates that the specific view is probably the most productive.

The problem facing an investigator is apparently not one of performing a crucial experiment concerning the effective method for clinical management of dyslexic children, nor of explaining away the evidence of other investigations which conflict with the investigators' cherished view, but rather of meeting the practical considerations of how many children may be dealt with effectively and at what pain. By "effective" and "pain" we mean the same thing that current education means in establishing goals.

A Research Program

In 1960 investigation was initiated at the Reading Research Institute

at Berea College. The program had two primary aims: understanding dyslexia as a diagnostic entity, and the development of specific remedial procedures. Relative to the second of these, there was an orientation of: 1. Developing procedures and materials which might be used by semi-skilled or unskilled individuals as instructors under supervision; 2. developing an intensive program which might reduce treatment time; 3. developing programs which might be incorporated into ongoing public school programs; and 4. developing programs which might be economically feasible.

Instructors

In regard to the first item, instructors selected were college graduates, college students, or upper level (junior or senior standing) high school students. None of these had had previous experience in remedial work. College major or previous work experience were not considered. The only requirements were that the applicants were successful in an "average" way in their chosen area of interest, i.e., that they were not drop-outs and that they expressed a desire to participate. Public announcements were made concerning summer employment. There was no attempt to solicit individuals from particular college departments. Applications were sent to those who expressed interest, and selection was made on the basis of the application. The pay for the eight week period was $300.

A six-hour orientation program was presented prior to the beginning of the program and a half-hour staff meeting was arranged daily to discuss the nature of dyslexia, ongoing research, and plans for the tutorial sessions.

Each instructor was assigned three students for individual tutorial work and participation with other instructors in small group work.

Students

Twenty-one subjects were selected on the basis of standard clinical instruments, special devices to indicate level of perceptual-motor functioning, developmental information provided by parents. All of the subjects possessed the characteristics indicated as constituting a dyslexia syndrome. All had I.Q.s of 100 or better as indicated by the Stanford-Binet. All fell within the normal range as indicated by the Rorschach and Draw-a-Person test. In addition, the social status scale proposed by Eels et al was administered and only those who fell within the upper or middle classes were included. All of the subjects were drawn from urban areas where educational facilities were regarded as adequate. All of the subjects were aware that they had a reading problem. The problem had been diagnosed by school authorities and/or psychologists with the consequence that all had received remediation of the usual variety in the schools and most had, in addition, received private tutoring. The ages ranged from 14 to 24. There were 18 males and three females.

Program

The program was scheduled as follows:

7:30 a.m. Individual tutorial session
8:30 a.m. Labor
9:30 a.m. Auditory discrimination
10:30 a.m. Small group
11:30 a.m. Recreation
12:30 a.m. Lunch and free time
1:30 p.m. Individual tutorial session
2:30 p.m. Labor
3:30 p.m. Testing
4:30 p.m. Small group session
5:30 p.m. Dinner
6:00 p.m. Recreation

The program operated five days a week for eight weeks. Student housing and dining facilities were those ordinarily provided for Berea College students.

Individual Instruction

This period aimed at presenting an alphabetic-phonetic-structural-linguistic approach by way of a multi-sensory method, i.e., vision, audition, kinethesis, and tactation. The program was a reading, writing, speaking, and spelling one.

Small Group

This session aimed at allowing the individual an opportunity to socialize his acquired reading skills in a small group of students who all operated on approximately the same level. Here concepts introduced in the individual tutorial sessions were reviewed and reinforced. The grouping was flexible and, as a student progressed, he changed groups.

Auditory Discrimination

These classes were organized to aid in the ability to discriminate speech sounds in words. Each student's speech was analyzed as it derived from verbal productions, then materials were presented which allowed for corrective experiences.

Testing

Continual testing allowed for modifications of programs for each individual and, at the same time, provided information concerning the nature of dyslexia.

Labor

Each Berea College student was required to participate in a program requiring 10 hours of assigned labor for which the participant received pay. The students of the Summer Program were required to participate so that they would not be segregated from the other students on the campus.

Recreation

The program was so designed as to maximize rhythmic activity, directionality, and laterality. Exercises and games which emphasized perceptual-motor skills were of particular significance.

Materials

Joos (1966) recently expressed a view regarding a structural-linguistic approach. She says: "English is a language which consists of closed pattern units called words, which are arranged in a closed pattern called a sentence. A closed pattern is a unit with a definite beginning and a definite end. English words are closed on both ends; when they are arranged together to form a sentence, they are not normally changed by linking between words. English sentences are closed. They start in a definite way, continue in one of a very few patterns, and end in a definite manner." While this is a current statement, the work of Bloomfield, Chomsky, and others provides the theoretical and statistical basis for such a generalization. It was this orientation which served as an assumption on which the material was based.

The material required the student to learn the name of a letter and the sound of the letter; for this reason we referred to the operation as alphabetic-phonetic. Letters were introduced; the student was asked to identify the letter by name, to trace the letter on a model with a finger of the preferred hand, to reproduce the letter on sandpaper without the model, then to write the letter with a pencil. A sound was then given the letter, and the student was asked to write the letter while making the sound. As soon as the student could learn two letters, such as a and t, they were added together to form a larger language unit, a phonogram or word family. Additional consonants could then be learned so that words were formed. As a consequence of this procedure, the operation was termed structural-linguistic. By way of this procedure, the student was able to read at the first session, certainly positive feedback for the non-reader. As he progressed and encountered difficulty, he had all of the necessary skills for decoding. From this elemental beginning there was a continual progression to more complex linguistic units.

The consonants selected for initial introduction were high incidence ones. Only short vowels were introduced in the beginning. However, even in the early stages of instruction it was recognized that some words which were exceptions to the presentation would be required. These words were reduced to a minimum and only those which necessity demanded were taught as sight words. These were presented as total sound units, and the process described for single letters was employed.

After all of the short vowel phonograms were introduced and related to all beginning consonant sounds, all initial consonant blends were related to already recognizable phonograms. The same was true for digraphs. Then there was an expansion by means of the vowel shift from short to long by the addition of a terminal e. The material continued in expansion

and development until the college level was attained: the simple phonogram gave way to words and words to expressions and phrases.

While such material was being presented, it was felt that the student should be encouraged to read as much additional material from as many sources as possible. A large quantity of age-graded material was employed. If there were words in this material that had not yet been covered by the structural material, they were "given" to the student.

Some schools of language instruction assume that oral and verbal comprehension far outstrip encoding and decoding facility. In other words, the child knows the meaning of the word when he hears it and of the word when he says it, but he must learn to relate the written symbol to the sound. In our judgment, this could not be assumed. Consequently, as reading or decoding progressed, the instructor was urged to make frequent inquiries to have assurance that the student knew the meaning of the words.

It was believed that hearing sounds accurately was important in producing the sounds orally or in writing. In the beginning stages of instruction, the instructor overemphasized all the sounds in order for the student to make the relationship between sounds and written symbols. Materials were prepared which emphasized discrimination.

Spelling was conceived as a part of the total language learning process. Spelling is an accurate patterning of letters within a word; consequently, the pattern must be reproduced exactly as we accept the pattern in our language. It is not enough that the proper letters are included - they must be produced in correct serial ordering. Once the student grasps the simple concepts of sounds and symbols, these are easily transferable to more complex situations. Thus, the individual learned to spell as he learned to read.

We felt that many arguments concerning language instruction were meaningless; that the material must be interesting or express social class position, or maintain strict vocabulary control, etc. In our judgment the person should have the competency to read, write, and spell, regardless of the content.

Results

The Gates Diagnostic Reading Test was administered at the beginning of the session and again at the end. This indicated an average gain in oral reading ability of 1.5 years. Despite the fact that these subjects were supposed to learn only slowly and laboriously, if at all, we found progress at the rate that might be anticipated for any group receiving concentrated instruction.

Many questions were raised concerning remediation of this nature. Perhaps the most significant was: does the increase remain stable, or is there a decided regression? Measures of reading ability were taken 10 months after the termination of the program. There was a drop of 0.12

years. Despite the fact that all of the subjects entered into a regular school program there was no increase and an insignificant decrease in performance. In our judgment there was a need to replicate the study.

Replications and Variations

The following summer, 1961, the program was expanded to include 43 subjects. There were 36 males and seven females. The selection of the students conformed to the same criteria as the preceding years. The instructors were again individuals with no special training. Pre- and post-test scores on the Gates Diagnostic Test indicated a mean increase of 1.65 years.

These findings indicated that success was not due to chance factors. The population was tested 10 months later and again there was a slight but negligible decrease of 0.23 years.

Reviewing the problem and the program it appeared desirable to apply remediation as early as the difficulty might be recognized and the individual might be accepted into a boarding college community. Arbitrarily, it was felt that ten years of age was the minimum age that would meet these requirements. The summer of 1962 allowed for an expansion in terms of number and age; 67 subjects were accepted for participation. There were 55 males and 12 females. The age range downward included 24 subjects, while 43 were in the 14 and older category. The Gates Diagnostic Reading Test was again employed and an increase of 1.68 years was obtained. There was an analysis of scores in terms of the two age groups, but this yielded no significant differences.

The two previous years had indicated that there was no increase during the regular academic year. It appeared desirable to develop some type of program that might provide continued help during the school year. Subjects from the Louisville, Kentucky, area who had participated in the Summer Program were randomly divided into two groups. One was provided three hours of small group instruction (not more than 8 in a group) each week, while the other received no instruction. The program was initiated in November and continued until May. The N was 24. There were 75 hours of instruction. The Gates was administered in June. Those receiving instruction progressed 0.70 years while those not receiving instruction regressed 0.16 years. This was interpreted as meaning that even a moderate amount of help might provide the basis for continued development once a structure had been initiated.

In 1963, there was an expansion to 82 subjects. There were 67 males and 15 females. The sample included 43 subjects in the age range, 10-13, and 39 subjects 14 years and older. A program in arts and crafts was initiated for those in the seven - 13 age group. This was designed to provide additional fine motor skills and to develop greater perceptual-motor organization. A program which we refer to as "patterns" also was initiated. This was designed to deal primarily with tonality and temporality. The primary purpose of the class was to isolate basic rhythmic

and tonal units, provide experiences with these and employ them in more complex organizations. All of the students participated in the "patterns" program. The Gates Diagnostic Reading test was administered and the pre-post difference was 1.85 years. There were no significant differences between the two age groupings. This was surprising since the younger group had received additional training in fine motor skills. As is usually the case, the program was indicated and one which was assumed to more systematically develop fine motor skills and perceptual acuity was developed.

The 1964 program was a replication of the 1963 program with the exception of the revised arts and crafts program. There were 85 subjects, 68 male and 17 female. Forty-two subjects were in the age group 10-13 and 43 were in the 14 and above age group. The increase as measured by the Gates was 1.89 years. Again there was no significant difference between age groups.

The 1965 program accepted 87 participants. There was no "patterns" program. The increase for the eight weeks was 1.92 years. It was apparent that the patterns program, as it was organized, did not contribute to total language improvement.

The 1966 program accepted 92 participants. A revised patterns program was introduced. In this program more attention was given to directionality and rhythm than had been included previously. The increase in oral reading, as indicated by the Gates-McKillop, was 2.06 years. Certain activity type programs became questionable. In other words, music, art, physical education, even when especially designed for dyslexics, did not feed over into reading ability. To determine what effect might be achieved without any such program at all, 45 dyslexic children, ranging in age from seven to 14, and conforming to previous selection criteria were instructed for three hours each Saturday for ten weeks. The instructors were volunteers from the Junior League of Birmingham. These individuals had had no previous remedial instructional experience. They received six hours of orientation prior to undertaking the task of instruction. The material was alphabetic-phonetic-structural-linguistic material and the method was multisensory. A 30 minute staff meeting was scheduled each week to answer questions, help plan activities for each child and to provide additional instruction in the use of the materials. Four staff members supervised the instruction while it was in progress, demonstrating how a task might be done should a volunteer raise a question. The Gates-McKillop Oral Reading Test was administered at the beginning and at the end of the program. The rate of increase was 0.99 years.

The past summer, 1967, 97 students were selected for participation in the Berea program and 112 were selected for participation in a day program at the Birmingham University School. The programs differed in that there was no extensive perceptual-motor training as provided in a recreation program, there was no arts and crafts class, and there was no patterns class at the Birmingham site. In addition to these programs, the students at Berea received an additional hour of individual instruction for four weeks. Employing the Gates-McKillop, an increase of 2.24 years was obtained for the Berea Program and 2.00 years for the Birmingham program.

At the Berea site, tests and rating scales were devised for activities in the patterns class and for activities in the recreation program. Measures of initial and terminal performance could thus be taken as indices of improvement. When these measures were correlated with measures in language performance, there were no relationships beyond chance.

Seven years of research with dyslexic children employing different variables indicate that when highly structured material is employed in a one-to-one situation, utilizing a multisensory approach, success may be obtained. the instructors do not have to be highly trained. No additional equipment, such as machines, special games, and the like, need be utilized. No special relationships need be established between the instructor and the student. As a matter of fact, instructors were warned not to psychologize or handle the individuals needs, traumas or interests in the learning situation, or to establish a transference of a nature or intensity different from the ordinary teacher-student one. No inducements were employed for student participation. The findings seem to indicate that if a subject responds and the response is satisfactory, then a condition is brought about which alters what the individual wants to do. By providing structures for additional cues of a kinesthetic and tactile nature, the individual found he could deal with symbolic material and, as a consequence, learning took place. There is no need to resort to such dei ex machina as interest, rapport, motor integration, etc.

Behavior deficits, as they exist in dyslexia, are not part of an integrated totality so that learning in one area necessarily affects the whole; specifically, bouncing on a trampoline or walking a balancing bar may improve balance and coordination, but there is no indication that it can improve reading. If concern is expressed with the management of all the symptoms found in dyslexia, then it would appear that a specific remedial procedure for each must be devised.

A program is now under way in a public school in Alabama in which 196 subjects, in grades four through eight, who have been diagnosed as dyslexic are receiving remediation. Initial screening was performed by classroom teachers who had received a 15-hour workshop on the nature, diagnosis, and remediation of dyslexia. The individuals screened by the teachers were then referred to a committee of teachers in each school who had received additional training in the administration of specific tests. The results of these tests, teachers reports, and material from the cumulative folders were reviewed by the teachers and the staff of the Reading Disability Center of the University of Alabama Medical College. If the results were inconclusive, additional tests were administered by the Reading Disability Center staff or the child was referred to another agency. Parents were notified of the findings and of the nature of the forth-coming program and, on the basis of this information, were allowed to make a decision concerning their child's participation.

In the elementary school all students were placed in reading classes commensurate with ability; there are four classes for each grade level. All those children with dyslexia would automatically be placed in the

lowest reading group. The teacher of this group chose to work with the dyslexia program. Those children with parental permission are released three periods a week to receive individual instruction. Those remaining in the regular class are worked with by the teacher. Twice weekly the entire class works on material which will be supportive of the remedial program. At the Junior High school level, those diagnosed as dyslexic and who have parental permission are released from study hall to be assigned to a remedial reading section. In this section, they receive five hours of individual instruction per week. The individual instruction is provided by 192 volunteers provided by the Junior League, the Council of Jewish Women, and the Parent Teachers Association. The total cost per child is $40. This fee covers training of the teachers, training the volunteers, and providing the material for individual instruction.*

If this program is successful, many of the problems of clinical management of the dyslexic will have been dealt with. In other words, it may serve as a model which may be sharpened and perfected. Some areas of concern in clinical management have been specified and dealt with with moderate success. These are: 1. procedures and materials which might be used by semi-skilled or unskilled individuals as instructors under supervision; 2. an intensive program which might reduce treatment time; 3. programs which might be incorporated into ongoing public school programs; and 4. programs which might be economically feasible. There may be other techniques, procedures and operations which might be equally effective, or perhaps even more effective, but until the problems are dealt with practically, many arguments are of the nature of little boys who contend that they can spit the farthest.

*In the 1st year 70% of the dyslexic students in this program were dismissed to the regular class as fully remediated. In the 2nd year 74% were released.

B. Program Operation

The model provided by Shedd was accepted by the PDC director as feasible for the NACSS. There were four major goals of the PDC program. These were:

1. To set up a diagnostic program to determine dyslexic children
2. To set up a demonstration center for the teaching of dyslexic children and observation by teachers
3. To provide in-service training for teachers in the area
4. To educate the public to the problem of dyslexia

The program operation procedures and results are presented under each of these goals.

To set up a diagnostic program to determine dyslexic children in the area:

Testing was done initially (1967-1968) at the center. The individually administered battery included the WISC, WAIS or Stanford Binet Intelligence Scale; Berea Gestalt Test, Right-Left Test of Directionality; Draw a Person Test and the Gilmore Oral Reading Test. The following case history was taken from the parents:

NAME _____

BIRTH DATE _____

FATHER'S NAME _____

HANDEDNESS: Left _____ Right _____

MOTHER'S NAME _____

HANDEDNESS: Left _____ Right _____

Living together: Yes _____ No _____

Is child adopted? Yes _____ No _____

List children in order of birth, including applicant:

Name _____ Age ____ Handedness: Left ___ Right ___

Name _____ Age ____ Handedness: Left ___ Right ___

Name _____ Age ____ Handedness: Left ___ Right ___

Do any of the siblings have any physical or learning disabilities?

Describe: _____

1. What previous evaluations, including neurological, psychological, psychiatric, has the child had? Include examining institution or individual, address and diagnosis._____

_____

2. Is performance on I.Q. tests spotty, i.e., high in some areas, low in others?

_____

3. Are achievement test scores given by educational institutions spotty, i.e., high in some areas, low in others?_____

_____

4. Has child been diagnosed as a poor reader? Yes_____ No_____

By whom was the diagnosis made?_____

_____

5. Was the mother's health poor during pregnancy? Yes_____ No_____

6. Did the mother have difficulty carrying child to term? Yes_____ No_____

7. Did the mother have any illness during pregnancy? Yes_____ No_____

8. If so, what?_____

9. Did the mother incur accident or injury during pregnancy? Yes_____ No____

10. If so, what?_____

11. Was labor prolonged? Yes_____ No_____

12. Was labor precipitious? Yes_____ No_____

13. Were high forceps used? Yes_____ No_____

14. Was this birth Caesarian? Yes_____ No_____

15. Was this a breech presentation? Yes_____ No_____

16. Was the child discolored at birth? Yes_____ No_____

17. Did the child require oxygen at birth? Yes_____ No_____

18. Has the child ever been knocked unconscious? Yes_____ No_____

19. Has the child had convulsions? Yes_____ No_____

20. Has the child ever had extremely high fevers for prolonged periods? Yes _____ No_____

21. Is there any history of epilepsy in either family? Yes_____ No_____

22. When was the child weaned? _____

23. When was the child toilet trained?_____

24. Did the child suffer from enuresis? Yes_____ No_____

25. At what age did the child walk?_____

26. At what age did the child talk?_____

27. At what age did the child ride a tricycle or bicycle? _____months.

28. Does the child drool? Yes_____ No_____

29. Does the child suck his thumb? Yes_____ No_____

30. Does the child bite his nails? Yes_____ No_____

31. Does the child bang his head? Yes_____ No_____

32. Does the child have peculiar food habits? Yes_____ No_____

33. Is the child finicky? Yes_____ No_____

34. If allowed, would he take in a great amount of sugar? Yes_____ No_____

35. If allowed, would he drink a great deal of milk? Yes_____ No_____

36. Does the child have any known allergies? Yes_____ No_____

Type:_____

37. Does the child seem clumsy? Yes_____ No_____

38. Does the child have any tics or grimaces? Yes_____ No_____

39. Is the child hyperactive? Yes_____ No_____

40. Is the child partially sighted? Yes_____ No_____

41. Did or does the child wear glasses? Yes_____ No_____

42. Did the child ever have any fusion problems? Yes_____ No_____

43. Does the child have a hearing loss? Yes_____ No_____

44. Does the child have difficulty in discriminating any sounds? Yes___ No___

45. Was the child's speech difficult to understand? Yes_____ No_____

46. Does the child stutter? Yes_____ No_____

47. Does the child slur his speech? Yes_____ No_____

48. Does the child have difficulty in saying certain words? Yes_____ No_____

49. Can the child understand what is said to him? Yes_____ No_____

50. Is the child accused of not paying attention or daydreaming? Yes___ No___

51. Has the child ever had any speech problems? Yes_____ No_____

52. What help did he receive?_____

_____

53. Does the child have musical ability? Yes_____ No_____ Explain:_____

_____

54. Does the child show unselective, often excessive, displays of affection?

Yes_____ No_____

55. Does the child show better judgment when playmates are limited to one or two? Yes_____ NO_____

56. Does the child get along better with younger children? Yes_____ No_____

57. Does the child get along better with older children? Yes_____ No_____

58. Is the child overpowering in relation to children in his play group? Yes

_____ No_____

59. Has the child been in frequent difficulties with school or other authorities?

Yes_____ No_____

60. Does the child have temper tantrums when crossed? Yes_____ No_____

61. Is the child taken advantage of by other children? Yes_____ No_____

62. Has the child been described as being immature? Yes_____ No___ By whom

was the description given?_____

63. Is the child easily distracted? Yes_____ No_____

64. Is the child accused of not paying attention or daydreaming? Yes___ No___

65. Is the child explosive in relation to frustrating situations? Yes___ No___

66. Does the child become upset easily? Yes_____ No_____

67. Would you describe the child as impulsive? Yes_____ No_____

68. Does the child have a few very close friends or many casual friends?
Few_____ Many_____

69. Does the child become overexcitable in play with other children? Yes____
No_____

70. Does the child display poor judgment when in a group? Yes_____ No_____

71. Does the child need to cling, to touch, or to hold on to others? Yes____
No_____

72. Does the child cry easily? Yes_____ No_____

73. Does the child pout? Yes_____ No_____

73A Has the child received psychiatric or psychological counseling? Yes ____
No_____ If answer is yes, where did child receive such counseling?_____

_____

74. Does the child do well in mathematics? Yes_____ No_____

75. Does the child show variability in school performance? Yes_____ No_____

76. How is this indicated?_____

77. Does the child demonstrate poor organizing ability? Yes_____ No_____

78. Have you or the teacher noticed slowness in finishing work? Yes_____
No_____

79. Has it been considered that the child is an underachiever? Yes_____ No__

80. Has the child been retained in a grade or grades? Yes_____ No_____ What

grade(s)?_____

81. Has the child been "socially" promoted? Yes_____ No_____

82. Has the child had tutorial help in language skills (reading, writing, and spelling)? Yes_____ No_____ Indicate when and for how long:_____

_____

83. Has the child received special help in the schools? Yes_____ No_____

Indicate when and for how long:_____

_____

OTHER COMMENTS

1. The procedure for testing was altered slightly over the three-year period. In 1967-68 prior to testing the faculty of each school was informed of the characteristics of dyslexia. Filling in checklists of the syndrome, teachers referred pupils. It was recommended that children with IQs 85 or greater be referred. Because of the extensive amount of time required to give individually-administered intelligence tests group IQ test scores were used in screening. Testing dates were set for each school. Groups of 10 to 20 children were given the Left-Right, Draw-A-Person and Berea Gestalt Tests in one sitting. The Gilmore Oral Reading Test was administered individually. Results were presented and explained to each principal. Cumulative record sheets with testing results were entered for each child tested.

In 1968-69 with additional testing staff, group testing was eliminated. The entire battery was individually administered. The battery now included the above mentioned tests and a handwriting sample. More reliable results were obtained and other test patterns could be more clearly delineated. Individual intelligence tests were administered as needed. (WISC, Stanford-Binet, Peabody) Results were sent to principals and explanations provided when requested. Cumulative record sheets were developed and placed in each child's folder.

In May of 1968 teachers were requested to make referrals for 1969-70, since they were more familiar with a child's performance than those who might make referrals early in the school year. The revised referral form used was as follows:

TEACHER REFERRAL FORM FOR DYSLEXIA TESTING

Teacher_____ Child's Name_____

Date of Referral_____ School_____

Grade_____ Birthdate_____

School IQ Score - 3rd_____ 6th_____ Other_____

Metropolitan past two years-fill in grade equivalent where applicable:

	Word Know.	Word Disc.	Read-ing	Spell-ing	Lang.	Lang. St.Sk.	Arith.	Social Arith.	Studies
Gr._____									
Gr._____									
Gr._____									

What is his best subject ?___ What is his worst subject ? ___

Classroom Performance	Yes	No
1. Is easily distracted visually	___	___
2. Is easily distracted by noise	___	___

	Yes	No
3. Over-reacts to most situations	___	___
4. Daydreams and has trouble attending	___	___
5. Is quiet and sluggish	___	___
6. Can he follow directions ?	___	___
7. Can do well in math concepts and operations	___	___

Social Behavior

Has many friends____ few____ older_____ younger____

Plays with few____ older_____ younger____

Is immature yes ___ no___

Appears to be trying yes ___ no___

Displays poor judgment in a group yes ___ no___

Test Behavior

Seems to know material but cannot apply it when tested yes___ no___

Has difficulty retaining material yes___ no___

Knows it today but doesn't tomorrow yes___ no___

Observations

Hearing loss Yes_____ No_____ Rubs eyes Yes_____ No_____

Wears glasses Yes_____ No_____ Needs glasses Yes_____ No_____

Difficulty saying certain words Yes_____ No_____

Frequently wants questions repeated Yes_____ No_____

In your opinion is there a poor home environment?

A testing workshop was held in July of 1968 to train teachers under staff supervision to evaluate children for visual-motor perceptual problems.

In 1969-70 teachers who had been trained to administer the testing battery obtained released time from their classes to test children at their schools. The battery was expanded to include the Slosson Intelligence Test.

Test results were confirmed by staff members. A class diagnosis was sent

to the teacher and principal. Cumulative record sheets had been further refined and printed on different-colored paper depending upon the problem. Each was similar in the information reported; each was different in heading. The three headings are presented with the information which is the same for each report.

CUMULATIVE REPORT

_____was tested and found to have SIMPLE DYSLEXIA, indicating a problem in decoding.

CUMULATIVE REPORT

_____was tested and found to have a related learning disability (COMPLEX DYSLEXIA) indicating some problem in decoding and a possible problem in comprehension. These children may also experience some difficulty in math.

CUMULATIVE REPORT

_____was tested and found to have a problem, but not perceptual in nature. Further investigation is demanded.

Grade_____ Oral Reading Level_____ School Year_____

Date Tested_____ Individual Test_____ Group Test_____

Reading Level Entering Class_____ Date_____ School_____ Grade_____

IQ

Kulman Anderson_____

Peabody _____

Slosson _____

WISC _____

Verbal _____

Performance_____

YEARS IN CLASS

_____

_____

_____

_____

Released from class_____

Last recorded oral reading level_____

COMPREHENSION

Verbal Expression Good_____ Average_____ Needs Improvement_____

Can express what he has read in his own words Yes_____ No_____

Written Expression Good_____ Average_____ Needs Improvement_____

Can express what he knows in writing Yes_____ No_____

_____
Testing Teacher

_____
Testing Supervisor
Perceptual Development Center
Phone 442-5132

In January of 1970 all testing was curtailed. It was resumed later in the year by Perceptual Development Center staff members. During this time a team approach was taken. Four to ten staff members trained in testing worked together in a large room. All tests were individually administered. Each member of the team administered one part of the battery. The Gates-McKillop Oral Reading Test and Spelling Subtest were added to the battery. This approach worked extremely well. It is planned to form a testing team in the school system for the 1970-71 school term.

During the first year of operation (67-68) 1,828 children, or 20% of all enrolled children in the school, were referred by teachers for testing. 929 or 10.2% of children in grades 3-9 of Adams, Franklin and Wilkinson County School Systems were found to have some form of dyslexia - mild, moderate, or severe. 899 were not found to be dyslexic. No other visual-motor perceptual problems were identified.

In 1968-69, 711 children or 11.4%, of the school population in grades 1-9 were referred for testing. At this time, due to additional data provided by Shedd concerning testing, a difference between developmental dyslexia and related disorders, hyperkinesis, was made.

424, or 6.8%, were found to be dyslexic. 143, or 2.3%, were found to be hyperkinetic. 93 or 1.5% were found to have visual-motor perceptual problems but were hampered additionally by low intellectual capacity, an IQ below 90. 51, or .8% had no visual motor perceptual problems. 660, or 10.6% manifested visual-motor perception problems.

Further testing in Wilkinson and Franklin Counties and initial testing in Amite County involved 456, or 21.4% of the children in grades 1-9. 267, or 12.5% of the children were dyslexic. 189, or 8.9% were not dyslexic. Since testing was done early in the school year, only dyslexics were identified.

In 1969-70 testing results were separated by semesters because of an almost complete shift in school population after court-ordered integration implemented in January. Prior to January 235, or 6% of 3,868 children in seven schools, were referred. 134, or 4%, were dyslexic. 70, or 2% were hyperkinetic. 24, or .6% evidenced low IQ. Seven, or .2% manifested no visual-motor perceptual disability.

Between January and June, 75 children were evaluated as dyslexic, 45 were hyperkinetic, 34 were children of subnormal intelligence, and 3 had no visual-motor perceptual problems. In addition 51 children were retested. Most of the 51 were given individual intelligence tests.

County testing during 69-70 in Pike County revealed that 105, or 4.4% of those referred were dyslexic; 103, or 4.4% were hyperkinetic; 12 or .5% had visual-motor perceptual problems with low intellectual capacity; 10 or .4% manifested no visual-motor perceptual problems. 220 or 9.2% of the school population in grades 1-8 evidenced visual-motor perceptual problems.

Wilkinson and Franklin Counties carried out their own testing programs in 69-70 with teachers previously trained by the Perceptual Development Center staff to screen for visual-motor perceptual problems. The PDC staff continued to supervise and advise these teachers.

A Pre-School Study of 399 kindergarten and Headstart children was conducted in 1969-70 to determine if children who were "high risk" for learning tasks could be selected at 5 years of age and an appropriate first grade program planned for them. This study is reported in its entirety in Section IV.

Table I Cumulative Results of School Screening 1967-70

	Dys. %	Hyp. %	IQ %	No. %	Total %
67-68	10%				10 %
68-69	7%	2%	2%	1%	12 %
69-70	4%	3%	1%	1%	9%

Table 1 shows results of the three-year period. Percentages cannot be added for a precise cumulative estimate, but must be considered by year since populations being tested were not the same from year to year. Additional counties were added along with normal population changes in Adams County. Categories were not well delineated during the first two years. Only half a year percentages are shown for 1969-70. However, it is the clinical estimate of the testing staff that approximatley 15% of the population is dyslexic and 5% is hyperkinetic. Estimates of low IQ cannot be offered at this time since only low IQ cases which had hyperkinetic characteristics were referred for evaluation.

2. To set up a demonstration center for the teaching of dyslexic children and observation by teachers.

1967 - 1968 Program

The trained staff of the Perceptual Development Center consisted of the director, three teachers, a counselor, a recreational director, and a testing supervisor. The materials and methods used for instruction of reading, writing and spelling were the Alphabetic-Phoenetic-Structural Linguistic (APSL) Approach to Literacy. This program presented a completely structured breakdown of the English language combined with a multi-sensory approach. Integral to the training were auditory discrimination and perceptual motor skills. Math, science, English, and social studies were taught with traditional material, but were recast in structural terms. Flexibility of scheduling was employed to allow each child's educational program to be changed as observation indicated.

Volunteers

In order to give each student one-to-one instruction in APSL material volunteer instructors were used, as suggested by the model. Community-minded women were recruited to work with dyslexic students. Each volunteer was assigned a specific day and time to work. The volunteers were given a five-hour workshop by the director. Regular workshops were held. Volunteers were always closely supervised by staff teachers.

In September, 1967, the Perceptual Development Center began to instruct 44 students who had been tested in August. Characteristics of the group were: 34 were male, 10 were female, the age ranged from 7-15 years, 41% had been retained one year in school, 9% had been retained two years (most of those who had been retained repeated the first grade.) The younger group (7-10) had a mean IQ of 99 (WISC), and the older one a mean IQ of 96. The younger group ranged in reading level from 0 to 1.9 and the older one from 1.3 to 5.2.

Both classes at the Perceptual Development Center were retested with the Gilmore Oral Reading Test in May, 1968. At the time of retesting 320 hours of specific reading instruction had been given. The results of the younger group indicated a 1.9 grade average increase. There was a range from 0 to 3.2 grade levels. 18 of the twenty students made progress ranging from .9 to 3.2 years, while only two failed to make measurable progress. The results of the older group indicated an average increase of 2.4 grade levels with a range from 1.0 to 4.7 years.

Program Variation

Four other classes were established later in the year. These classes were the beginning of an experiment with programs in the regular school setting using APSL for an hour a day in place of whatever procedure had been previously employed to teach reading. These classes were set up after screening identified the students as having the specific reading disability, dyslexia. These classes employed different variables. They were: Braden Elementary School, Cathedral Elementary and High School, Washington Elementary and Morgantown Elementary.

Fourteen children ranging in age from nine to 14 years were accepted into a program at Cathedral Elementary and High Schools. The average IQ was 105. A one-to-one ratio of instruction was employed. The program began in October, and the retest in May with the Gilmore indicated an average increase of 1.3 grade levels.

At Braden,42 children diagnosed by the Perceptual Development Center as dyslexic, were assigned to two classes. The mean IQ was 95. A one-to-one ratio of instruction was employed. The program began in October, and the retest in May with the Gilmore indicated an average increase of 1.3 grade levels.

Morgantown and Washington began a program in March. The Washington children ranged in age from ten to 12 years. The average IQ was 97. The class at Morgantown ranged in age from seven to nine years. The average IQ was 99. The volunteers worked on a five-to-one ratio. The total time per student in the remedial program was 55 hours. The average rate of increase on retesting at Morgantown was .55 grade levels and at Washington was .92 grade levels.

Table 2
Progress Chart
Gilmore Oral Reading Test
9/67 - 5/68

PDC

Instruction Period	N	CA	IQ	Initial Level	5/68	Ave. Total Change
9 Months	44	7-10	99	0-1.9	0-3.2	1.9
		11-15	96	1.3-5.2	1.0-4.7	2.4

Hour-A-Day

Braden (8mo.)	42	12	95			1.9
Cathedral (8 mo.)	14	9-14	105			1.3
Morgantown (3 mo.)		7-9	99			.55
Washington (3 mo.)		10-12	97			.92

Summer Program 1968

During the summer of 1968 the regular program was continued and a special program initiated. The 43 students attended the program for four hours a day and received individual reading instruction in APSL. Auditory discrimination, math, and English were continued as in the regular school year. Results of regular students are included in the 1968-69 instructional group reported below.

25 additional students attended an afternoon program for individuals APSL instruction and for group auditory discrimination exercises. The volunteers for the afternoon group were parents, Future Teachers of America, and Key Club students from Natchez-Adams High School and college students. Staff teachers supervised these volunteers. In 56 hours of instruction the 25 students in the afternoon program made an average improvement of 1.2 years in oral reading ability.

Table 3
Progress Chart
Gilmore Oral Reading Test
Afternoon Program Summer 1968

PDC

Instruction Period	N	CA	IQ	Average Total Change
8 weeks	25	10	94	1.2 years

1968-69 PDC Program

In 1968-69 the staff expanded to a director, assistant director, four teachers, four teacher aides, a recreational director, a director of volunteers, a testing supervisor and an assistant testing supervisor. The increase in staff was necessary due to the enlarging area to be served, the many additional hour-a-

day APSL classes being formed, the growing need to train volunteers and teachers and the request by counties for testing services.

Instruction

The APSL material continued to be the procedure used to teach reading, writing and spelling to dyslexic and hyperkinetic children. Auditory discrimination was continued for an hour a day to support and reinforce the series. During this year oral reading in small groups was done with Readers Digest Skill Builders, Merrill Reading for Meaning workbooks and SRA Satellite Kits.

Perceptual motor training was given to the two youngest classes daily to improve motor skills.

Teachers began to work in adapting the math materials to the needs of the dyslexic and hyperkinetic. Two major differences were noted with the regular math program, in this case "Modern Math Through Discovery" by Silver Burdett Company. These differences were:

(1) The material proceeded too rapidly for these students from one function to another. It was felt by the teachers that addition must be understood and done with ease before these students could proceed to subtraction.
(2) Modern procedures of understanding the "why" of math could only come for these students after rote learning of number facts. Much drill on addition, subtraction, multiplication and division was required. Of particular use to some was the use of sandpaper in memorizing these facts.

It was also noted that the more concrete the teacher could make number concepts the better these students could grasp math, especially the hyperkinetics. The teacher of the upper elementary class used Cuisenaire rods to concretize math for her students. Her impression was that the students understood and retained math better after this experience. (See Metropolitan Tests)

The Director and the teacher of the lower elementary class began to write a math series based on a format similar to APSL. At the end of the year, they turned their impressions over to Shedd and his staff who wrote and experimented with a specific math series at the Reading Research Institute during the summer of 1969.

In science and social studies it was found that the greatest difficulty in using traditional texts was the lack of organization of the material and lack of reading ability of the students in this group.

The following procedure was developed:

(1) Prepare the class for the facts you want them to learn, (survey and question).
(2) Read a portion of the text to them while requiring them to follow the teacher pointing to each word in their text, (read).
(3) Ask the specific questions the class had been instructed to listen

for, (recite and review).

The SQ3R method advocated for all students was particularly important. As the students reading abilities improved they were required to take over some of the reading. Major facts and ideas were stressed, not great detail. Larger segments of material were covered as the year progressed.

Tests for each chapter were constructed to teach the students to take various types of tests since they showed poor ability in any testing situation. For example, the first tests were true-false. When the student did well on these, a new test type was introduced such as multiple choice, then perhaps fill in the blank, then matching. Only when each type was mastered were all types of questions eventually combined on one test. Therefore test skills were taught at science and social studies periods.

English was, of course, discovered to be the dyslexic's and hyperkinetic's worst subject. Few students at the Perceptual Development Center understood any part of speech. Each part of speech was taught and used over and over in drill before any other procedure was attempted. Students were asked to go around the room and name nouns. When nouns were understood and could be used in sentences, action verbs were "acted out" in charades. Passive verbs were memorized. Sentence construction, punctuation, paragraph writing and finally writing a theme of several paragraphs were important progressive goals for these students who might know much information but evidenced great difficulty in writing it down.

Description of PDC Population 1968-69

The classes in 68-69 grew from two with 43 students to four classes with 61 students. The youngest group included seven and eight year olds; the lower elementary group was nine and ten year olds; the upper elementary group was eleven and twelve year olds; and the junior high group was thirteen, fourteen and fifteen year olds.

Characteristics of the group were: 42 were male, 19 were female, the average IQ was 97 and the average age was ten years, eleven months (10-11). From the 43 students attending the Perceptual Development Center during the 67-68 school year, 28 remained in the program for the 68-69 year, 13 were admitted in the summer of 1968, eight were admitted in September of 1968, and 12 entered at varying times throughout the year. 53 children were dyslexic. Eight children were diagnosed as having a related disorder.

Results

Because of varying periods of instruction, data evaluating the instructional progress was broken down in terms of months of instruction. The group of 28 children who had received instruction for 20 months (2 nine-month regular terms and one summer session) averaged eleven years, four months (11-4) in age, had an average IQ of 95 and an average 2.9 years in initial reading ability. After nine months of instruction the average progress was 1.6 years in oral reading ability. 20 months of instruction produced an average change of 2.8 years

Of this group 27 children (96%) made one or more years of progress, 22 (79%) made two or more years progress, 12 (43%) made three or more years progress, 5 (18%) made 4 or more years progress, 1 made more than 5 years progress and 1 made 6 years progress. One child made less than 1 year progress.

14 children who received instruction for 11 months (1 summer and 1 nine month term) began with an average of nine years, one month (9-1), an average IQ of 99, and an average reading level of 2.8. In May, 1969, the average progress was 1.7 years.

Of these 13 children 11 (85%) made more than 1 year progress, 5 (38%) made more than 2 years progress and 2 (15%) made more than 3 years progress. Three (23%) progressed less than a year.

Instruction for 9 months of eight children with an average age of ten years (10-0), IQ of 96, and initial reading level of 3.3 produced a change of 1.6 years.

Six (75%) of the children progressed more than 1 year and 3 (38%) progressed more than 2 years in nine months of instruction. Two (25%) progressed less than 1 year.

Table 4
Progress Chart
Gilmore Oral Reading Test
9/67 - 5/69

Instruction Period PDC	N	CA	IQ	Initial Level 9/67	5/69	Total Change
A. 20 mos.	28	11-4	95	2.9	5.7	2.8
B. 11 mos.	13	9-1	99	6/68 2.8	4.4	1.7
C. 9 mos.	8	10-0	96	9/68 3.3	4.8	1.6

To determine the effects of intervention in reading, the pupils' expected average yearly progress without intervention before entering the Perceptual Development Center was compared to the average yearly progress with intervention. That is, using the average yearly progress of the pupils before entering the Perceptual Development Center as a basis for computing progress each year, an expected reading level for 68-69 was computed. This expected reading level, figured on the basis of previous improvement without specific treatment was compared to the students' actual reading level in 68-69 after specialized training.

When they entered the Perceptual Development Center the average number of years in school of the 28 children receiving APSL instruction for 2 years was 4. Reading initially at a second grade level, the children had made an average progress per grade of six months. After an instruction period of two years the average reading level advanced to 4.6 with an average progress per year of 1.3 years. Without intervention the children might have been expected to make 2.8

years progress instead of the 4.6 years. In excess of expectation without treatment, the pupils made an average of 1.8 years progress in oral reading ability.

Children who received 9-11 months of instruction at the Perceptual Development Center entered after an average of 3 years in school and were reading at the second grade level. They had progressed on the average six months for each of the years they had attended school. After instruction the average reading level was 3.6 with average improvement of 1.5 years. Without intervention, progress of 2.6 years might have been expected. Progress in excess of expectation was 9 months.

Table 5
Comparison of Progress Without and With Specific Treatment
Perceptual Development Center Students

20 Mos. Instruction		9-11 Mos. Instruction	
N	28	21	
Yrs. in School	1-8	1-7	
Reading Level 9/67	2.0	2.1	
Progress in Regular Class	.5 yr.	.6 yr.	Progress in reading ability after entering the PDC has been over twice as great as it was before specific remediation.
Reading Level 5/69	4.7	3.6	
Progress PDC Per Year	1.3 yrs.	1.5 yrs.	
Expected Reading Level W/O Intervention 5/69	2.8	2.7	The students have on an average exceeded their expected reading level based on progress before entering the PDC by 9 months per year.
Exceed Exp. Reading	1.8 yrs.	.9 yrs.	

Program Variation 1968-69 Hour-A-Day Classes

As a result of the success of the Perceptual Development Center classes and three hour-a-day classes initiated during the first year, 20 classes in Adams County, two classes in Franklin County, and two classes in Wilkinson County began in September, 1968. Not all the children placed in classes were dyslexic.

With an average age of 13-3, IQ of 92, and reading level of 3.3, 17 children had received a total of 17 months of APSL instruction with an 8-month period in 1967-68, no summer instruction; and a 9-month period in 1968-69. During the 8-month time the sixth grade teacher supervised a 5:1 volunteer-pupil ratio three days a week. In 1968-69 the group was halved on the junior high level and the teachers changed. No volunteers assisted the teacher for the 7th grade groups. During the 8-month instructional period the class averaged 1.4 years progress; during the 9-month period the classes averaged 2.2 years

progress. Total progress was 3.6 years. Only 1 pupil made less than one year progress; 94% progressed more than 1 year; 76% progressed two years or more; 70% progressed three years or more; and 41% achieved more than four years in oral reading ability.

Two classes begun in March, 1968, had 3 months of instruction and 9 months in 1968-69. The average age of the 43 children was ten years, eleven months (10-11). With an average IQ of 98.5 the children read at 3.8 on the average in February, 1968. In May, 1969, the average reading level was 6.2 with a total average change of 2.4 years. Three children of the 43 made less than a year's progress; 93% progressed more than 1 year; 63% progressed more than 2 years; 26% progressed three or more years; and 14% progressed four or more years.

258 children received 9 months of hour-a-day instruction. Here the pupil-instructor ratio varied from 2:1 to 5:1 in classes using volunteers and from 6:1 to 26:1 in classes not using volunteers. The average age was ten years, five months (10-5); average IQ was 96; and average initial reading level was 3.3. In May the average reading level was 5.0, indicating an average increase of 1.7 years. 19% progressed less than one year; 49% of the students progressed one year or more; 30% progressed two or more years; and 2% made progress of three or more years. One child made more than four year's progress.

Table 6
Hour-A-Day
Gilmore Progress
Adams County

				9/67		
17 mos.	17	13-3	92	3.3	7.0	3.6
				2/68		
12 mos	43	10-8	98	3.8	6.2	2.4
				9/68		
9 mos.	258	10-5	96	3.3	5.0	1.7

Hour-a-Day classes were held in Franklin and Wilkinson Counties for 9 months. The 31 children at Franklin Elementary had an average age of 10 years, 6 months, an average IQ of 103 and were reading on the average at 3.8. After instruction the average reading level was 5.1 with an average progress of 1 year, 3 months. At Bryant Elementary 22 children with an average age of 10-4 and IQ of 81 began at an average of first grade, second month. After instruction they progressed to the second grade, eighth month level with an average progress of 1.5 years.

Winans Elementary instructed 15 children beginning at an average level of 3.8. After instruction the average level increased one year, three months to 5.1. Woodville Attendance Center had three classes. The youngest class averaged 8 years and had an average IQ of 96. Beginning at 2.0, they progressed to 3.6 with an average improvement of 1 year, 6 months. The next group of children averaged 10 years, 11 months in age and 102 in IQ. They progressed from an average level of 3.7 to 5.1, an increase of 1.4 years. The junior high students began at 5.2 and progressed to 6.7 with an average increase of 1.5 years.

Table 7
Hour-A-Day
Gilmore Progress
Franklin and Wilkinson County

Nine Months					
Franklin County			9/68		
54	10-5	92	2.5	3.9	1.4
Wilkinson County					
48	11-1	95	3.7	5.1	1.4

Summer 1969

The number of students enrolled in the Perceptual Development Center 1969 summer program was 112. Results are presented on the 95 children who attended four or more weeks.

Characteristics of the group were:46 students attending were regular Perceptual Development Center students attending a continued program, 38 were attending for the summer only and 11 had been in hour-a-day classes.

Two sessions, 8:00-10:00 and 10:00-12:00 were run. During the two hour program each child received an individual reading session on a one-to-one basis with a volunteer and group auditory discrimination.

Table 8
PDC Gilmore Progress
Summer 1969

	N	Avg. Prog.
Perceptual Development Center	46	7 mo.
Hour-a-Day	11	4 mo.
Summer	38	4 mo.
Total	95	5 mo.

1969-70 Program

The Perceptual Development Center staff remained the same as 1968-69. APSL was considered highly successful as a method of teaching reading, writing, and spelling to dyslexic children and was continued as the major teaching program. Volunteers continued to provide individual reading sessions.

Since the age of the students referred to the Perceptual Development Center was becoming younger each year it was felt by the staff that some readers more appropriate than Readers Digest Skill Builders were needed for this younger group. A study of linguistic readers used in Natchez indicated that the SRA Readers, Merill Linguistic Readers and Sullivan Readers might be appropriate. These readers were used in the progression indicated.

Table 9
Reading Levels
APSL and Co-ordinating Readers

	LEVEL	APSL	CO-ORDINATING READERS				
			MERRILL	SRA	SULLIVAN	BASAL READERS/Read for Mean./Be Better Rdr.	
ALPHABETIC AND PHONETIC INFORMATION OF ENGLISH LANGUAGE. REGULAR PATTERNS OF THE LANGUAGE. All consonants, short vowels, consonant digraphs. 2,000 words	1	Int.		Alphabet-Bk. 1			
	2	Int.	Book 1	Level A	Book 1		
	3	Int.	Book 2	Level B	Book 2		
	4	Int.	Book 3				
Continuing regular patterns of language, review of consonants, consonant blends, review of digraphs, all short vowel word families, 4,000 words	5	Bk.I	Book 4	Level C	Book 3,4,5		
	6	Bk.I		Level D	6, 7, 8		
Irregular patterns of language long vowels, other vowel sounds, vowels with R, other sounds with R, dipthongs, silent letters, syllables and stress, 8000 words of language, long vowel combinations	7	Bk.2	Book 5	Level E	Book 9, 10, 11	As the child can handle this material it is introduced. After Book 2 it is expected that he can read any library book or reader on his grade level. Reading for Meaning and Be A Better Reader are used to increase his skills in finding the most important facts in what he reads, putting these facts down in writing, answering questions concerning these facts and general comprehension skills.	
	8	Bk.2		Level F	12, 13, 14		
	9	Bk.2					
	10	Bk.2					
	11	Bk.2		Level G, H			
	12		Book 6	I, J, K, L			

Teachers in the Upper Elementary and Junior High classes indicated that when mechanical skills were adequate they found Merrill Linguistic Reading for Meaning and Be A Better Reader excellent material providing short informative paragraphs followed by questions to be answered.

During this year the younger two classes did use Structural Approach to Mathematics (Shedd). Added to this were appropriate workbook pages from the regular math program.

During this final year the Center organization became very clear. In the primary class the child should cover the alphabetic and phonetic information of the language, begin attack skills along linguistic lines, smooth auditory blending, read appropriate readers and be able to answer questions over the material he has read. He should learn also to write the alphabet, the words he has covered and to be able to spell these. He should begin to take dictation and by the end of the year remember and write a 4-5 word sentence. He should learn number concepts, counting, addition and subtraction. He was asked to master the days of the week, months of the year and sequence of these.

Primary Class Schedule

8:15-8:45	Alphabet Drills
8:45-9:00	Language Development (Calendar story, days of week, months of year)
	Group I
9:00-10:00	Individual Session with Volunteer in APSL (Teacher aide supervising)
	Group II
	Reading circle in Linguistic Reader and workbook
	Group I
10:00-11:00	Reading circle
	Group II
	Individual Reading Session with Volunteer
11:00-11:30	Motor-Coordination
11:30-11:50	Free Play
11:50-12:15	Lunch
12:30-12:55	Math (Flash cards and seat work)
12:55-1:15	Number drills
1:15-1:35	Listening Time (Gross sounds, sounds of speech, stories)
1:35-1:55	Language Development (Noun cards, colors, days of week, months of year)
1:55-2:15	Writing practice

In the lower elementary class the student continues to polish these skills, proceeds as far as he can in APSL, preferably through Book II and approaches an adequate reading level for age and IQ. He begins English grammar with nouns and verbs. He is introduced to multiplication and division. If it is necessary for the student to remain at the Perceptual Development Center at this point in the upper elementary class, he begins to be presented with a complete program of subject matter as intensively as he can master for his age and IQ. It is desirable at this point for the student to leave the special class for any subject he can take in the regular classroom.

Lower and Upper Elementary Class Schedule

8:15-9:00 Auditory
9:00-10:00 Group I APSL Group II English
10:00-11:00 Group I English Group II APSL
11:00-11:20 Science
11:30-12:00 Motor Coordination
12:00-12:15 Listening Time-Stories
12:15-12:45 Lunch
12:45-1:30 Math
1:30-2:15 Social studies

The teacher aide supervised the APSL volunteers. The teacher and aide divided the group by abilities for math, social studies and auditory.

The Junior High program should be for one of two groups:

(1) The student who is so severely handicapped by his perceptual handicap as to require continued support throughout his educational career.
(2) The student who is dyslexic or hyperkinetic and has had no previous help in school but can benefit from an intensive program of remediation probably lasting one or two years.

Junior High Class Schedule

	Teacher	Aide-Qualified Teacher
8:15-9:00	Auditory	APSL Individual Sessions under Supervision
9:00-10:10	English	
10:10-11:30	Social Studies	

In the final project year, 69-70, the Perceptual Development Center contained 4 classes as described with 65 students. The youngest group was 6 and 7 years old; the lower elementary group 8-10; the upper elementary group 10-12 and the Junior High group 13-15 years old. The groups were dictated by ability more than by age limits.

Characteristics of the group were: 46 were male, 19 were female, the average IQ was 96 and the average age was 10.7. 17 students had entered the original program in 1967-68, 12 entered in the summer of 69 and 8 enrolled in September 69-70. 38 children were dyslexic. 27 were diagnosed as having a related disorder.

Results 69-70 Program

As in previous years because of varying periods of instruction, data evaluating the instructional progress was broken down in terms of months of instruction. The group of 15 children who had received instruction for 31 months (3 nine-month and 2 two-month summer terms) averaged 12 years 4 months (12-4) in age (Sept. 1969), had an average IQ of 92 and an average of 2.5 years in initial reading ability. The total average change for children in this group in oral reading ability was 4 years.

Of this group 15 children (100%) made 1 or more years progress, 13 (87%) made 2 or more years progress, 10 (67%) made 3 or more years progress, 9 (60%) made 4 or more years progress, 4 (27%) made 5 or more years progress, 1 (7%) made more than 7 years progress. The average rate of progress per month was 1.4.

Eight children who received instruction for 22 months (2 nine-month, and 2 two-month summer periods) averaged 10 years 8 months in age (Sept. 1969), scored an average IQ of 96, and began with an initial reading level (July 1968) ot 2.8. In May 1970, the average progress was 3.9 years.

Eight children (100%) made 1 or more years progress, 5 children (63%) made 3 or more years progress, 2 children (25%) made 4 or more years progress and 1 child (12%) made more than 5 years progress.

Nine children who received instruction for 20 months (2 nine-month periods and 1 two-month summer period) registered an average age of 10 years 7 months (Sept. 1969). This average IQ was 93, and their initial reading level was 2.8. After the instruction period they had progressed an average 2.8 years in oral reading ability.

One child made 9 months progress only, eight children (87%) made 1 years progress; 6 children (67%) made 2 years progress; 4 children (44%) made 3 years progress; 3 children (33%) made 4 years progress; and 1 child (11%) made more than 5 years progress.

Nine children in the program for 11 months averaged 7 years 5 months in age. Their average IQ was 100. Beginning with a reading level of 1.8, they made 1.0 years improvement in oral reading skills. Five (56%) made more than a years progress; four children (44%) made less than one years progress. Three of the four children who made less than a years progress were hyperkinetic children with IQs below 90. The other child was hyperkinetic with an IQ of 96.

Three children were instructed for nine months. Their average age was 9.1 and average IQ was 99. Beginning the program with a 3.5 reading level, they made 2.1 years progress. One child made less than a years progress. One child made more than two years progress and one child made more than three years progress.

Table 10
Progress Chart
Seymore Oral Reading Test
9/67-5/70

PDC Instruction Period	N	CA	IQ	In. Lev.	5/70	T Ch.
31 mo.	15	12-4	92	2.5	6.5	4 years
22 mo.	8	10-8	96	2.8	6.7	3.9 years
20 mo.	9	10-7	93	2.8	5.6	2.8 years
11 mo.	9	7-5	100	1.8	2.8	1.0 years
9 mo.	3	9-1	99	3.5	5.6	2.1 years

Nine children had APSL in hour-a-day classes for 3-5 months before coming to the Center. Instruction time in the Center was 20-22 months. The average reading level before any APSL instruction was 3.3 years. Their average improvement after all APSL instruction was 5 years.

Eleven students had instruction periods so varied that they could not be categorized.

Following procedure, the Metropolitan Achievement Tests were administered. The averages by grade level are presented in Table 11.

Table 11

Metropolitan Achievement Test
Averages by Grade Level

Grade	N	Work Know	Word Discr	Read	Spell	Lang	Lang Sty Sk	Arith Comp	Arith Prob Solv	Soc Sdy Sdy Sk
1	3	1.7	1.9	1.6				2.1(T)		
2	8	2.1	2.7	2.4	2.2			2.9(T)		
3	11	2.7	2.6	2.7	2.6	2.4		3.4	3.0	
4	10	3.5	3.4	3.4	3.4	3.3		4.0	4.3	
5	11	4.9		4.4	4.7	5.3	4.5	6.0	5.3	4.9
6	7	6.5		6.0	6.0	6.5	7.4	7.2	7.3	6.2
7-9	13	6.2		6.1	5.5	6.9	7.0	7.4	7.1	7.2

In addition, the California and Stanford Achievement Tests, the Nelson Reading Test and the Gates-McKillop Diagnostic Reading Test and Spelling were administered in Sept, 1969 and in May, 1970. Average changes for each level are presented in Table 12.

Table 12

Improvement Noted on California Achievement Test, Stanford Achievement Tests, Nelson Reading, Gates-McKillop Diagnostic Reading Test Sept 69 - May 70

Change-Metropolitan

Gr	N	Wk	R	S	L	LSS	AC	APS	SSSS
4-6	24	1.2	.7	1.1	1.2	1.7	1.6	1.7	.9
7-9	13	.9	1.4	.6	1.4	1.0	.7	.7	.6

California-Reading

Level	N	Vocabulary	Comprehension	Total
Up Prim	14	.7	.5	.6
Int I, II	20	1.1	.7	.9
Jr. High	13	.8	.7	.8

-Math

Level	N	Reas.	Computation	Total
Up Prim	14	1.2	1.1	1.1
Int I, II	21	1.0	1.5	1.3
Jr. High	13	1.2	.4	.8

Stanford

Gr	N	Word Meaning	Paragraph Meaning
1	13	.2	.6
2	19	.9	.7
3	12		0

Nelson Reading Test

		Vocabulary	Paragraph	Total
1	14	.9	.5	.7
2	20	.8	1.1	.9
3	13	.8	.4	.5

Gates-McKillop Diagnostic Reading Tests-Spelling

1-2	8	.6
3-4	15	.5
5-6	19	.4

Peripheral to the design of the study but of tremendous consequences was the fact that the children participating in the study improved behaviorally. They were typically those identified as behavior problems; few knew how to handle themselves in groups, fewer had no idea of what was expected of them in a learning situation. A setting with children who also had problems; understanding teachers who the children knew were interested in them as individuals; and most of all, success in learning to read seemed to provide a basis for improved self-concepts.

Responses on questionnaires also reflect results of the program. Data obtained from the Perceptual Development Center teachers and the parents of the children is presented below:

Table 13
Perceptual Development Center Attitude Questionnaire
(Teacher on Students)

The student's attitude changed toward:			
1. Self	67-68	68-69	69-70
Yes	78%	77%	78%
No	5%	19%	18%
No need for change	17%	3%	
Undecided		1%	4%
N	36	63	65
2. Peers			
Yes	58%	64%	72%
No	11%	23%	11%
No Need for Change	31%	11%	3%
Undecided	2%	2%	12%
No Response			2%
3. School			
Yes	86%	83%	84%
No	3%	6%	11%
No Need for Change	8%	8%	5%
Undecided	3%	3%	
4. Home			
Yes	41%	42%	28%
No	11%	14%	9%
No Need for Change	27%	3%	16%
Undecided	21%	0	47%
Don't Know		41%	

In the 1967-68 and 1968-69 evaluations the staff rated the responses of the teachers. Teachers noted positive or favorable changes in more than half of their students in all categories each year. Few noted negative attitude changes. For the 1969-70 evaluation teachers were asked to rate the children's attitude changes. Results are as follows:

Table 14
Teachers' Evaluation of Student Change

	Self	Peers	School	Home
Number	51	47	55	18
Strongly Positive	25%	23%	35%	22%
Positive	69%	75%	65%	78%
Negative	6%	2%		
Strongly Negative				

Table 15

Perceptual Development Center Attitude Questionaire
(Parent)

Do you see any change in your child since his reenrollment at the Perceptual Development Center in the following ways:

	1967-68	1968-69	1969-70
1. His attitude toward himself?			
Yes	76%	95%	95%
No	21%	5%	5%
Undecided	3%	0	0
N	34	39	38
2. His attitude toward children his own age?			
Yes	62%	43%	73%
No	29%	45%	11%
No Need to Change		12%	16%
No Response	9%		
3. His attitude toward school?			
Yes	85%	80%	92%
No	15%	15%	0
No Need to Change		5%	5%
Undecided			3%
4. His attitude toward home?			
Yes	71%	64%	76%
No	29%	31%	8%
No Need to Change		2%	13%
Undecided			3%
No Response		3%	

After the first two years the staff evaluated the responses of the parents. In 1967-68 one parent considered the changes as unfavorable. Over half of the other parents considered the change as positive. One of two parents felt the change was strongly positive. In 1968-69 better than half of the parents noticed positive changes.

In 1969-70 the questionaire was refined to that parents rated the change in their children. Percentages are based on the number reporting change. Results are as follows:

Table 16

Results of Questionaire 1969-70 Administered to Parents who Evaluated Child

	Self	Peers	School	Home
Number	36	28	35	29
Strongly Positive	42%	21%	57%	28%
Positive	55%	75%	43%	69%
Negative				3%
Strongly Negative				
No Response	3%	4%		

Released students

Total enrollment at the Perceptual Development Center for the three year period (67-70) was 101. Total number of students released as remediated was 69 (68%). Three students moved, 1 student was recommended to a boarding school program for learning disabilitied students, one student was dismissed, and 28 were recommended to return to the Perceptual Development Center for the 70-71 school year.

Table 17
Released Students Data

	No. of Pupils	Average Instruction Time
1967-68	15	10 mos.
1968-69	20	16 mos.
1969-70	a. 25	24 mos.
	b. 7	25 mos.
Total released as Remediated	68	19 mos.

1969-70

Total PDC Enrolled-101
Total Released as Remediated-69
% Released as Remediated-68%
Moved-4 Dismissed-1 Recommended to Return-28 Recommended to other program-1

Results are presented for all students released as remediated from the Perceptual Development Center from 1967-70. Students were considered remediated when their skills in reading, writing, spelling and other subject matter were adequate for the grade level to which they were dismissed.

Data concerning their skills was obtained from the Gilmore Oral Reading Test, achievement batteries and the subjective judgment of the teacher as to their general overall functioning.

During the 1967-68 school year 15 students were released. One student was released after 5 months of instruction, 3 were released after 9 months of instruction, and 11 were released after 11 months of instruction. Average instruction time was 10 months. (See table 18).

In 1968-69 twenty students were released. One student was released after 4 months of instruction, one student after 9 months, and 4 students after 11 months of instruction. The remaining 14 students had entered the program in 1967. Three were released after 13 months, 4 were released after 20 months, and 7 were released after 22 months. The average instruction time was 16 months. (See table 18).

In 1969-70 one child was released after 8 months of instruction and 3 were released after 11 months instruction. The remainder of the students released had been in the program for 2-3 years. Four were released after 20 months of instruction, 4 were released after 22 months, 2 were released after 24 months, 1 was released after 27 months and 10 were released after 31 months. Average instruction time was 24 months. (See table 18, 1969-70a).

In addition to students who had received APSL only at the Center there was another group which could be analyzed. Seven children had received from 3-5 months instruction in an hour a day class or had received APSL instruction from a private tutor. These children attended the Center from 20-22 months. Average instruction based on total APSL received was 25 months. These children had been the most difficult to remediate in the hour-a-day class and on referral

to the Center were found to be severely dyslexic or hyperkinetic. (See Table 18, 1969-70b)

Average instruction time for the 61 children who attended only the Perceptual Development Center was 18 months. Total average instruction time including those who had APSL in addition to Center training was 19 months.

Table 18

Yearly Summary of Number of Released Pupils and Instruction Periods

	Instruction Period	N
67-68	5 mos.	1
	9 mos.	3
	11 mos.	11
Average	10 mos.	15
68-69	4 mos.	1
	9 mos.	1
	11 mos.	4
	13 mos.	3
	20 mos.	4
	22 mos.	7
Average	16 mos.	20
69-70	8 mos.	1
	11 mos.	3
	20 mos.	4
	22 mos.	4
	24 mos.	2
	27 mos.	1
	31 mos.	10
Average	24 mos.	25
All PDC Average	18 mos.	61
20 mos. + 5 mos. hour-a-day		5
20 mos. + 3 mos. hour-a-day		1
22 mos. + 6 mos. tutor		1
Average	25 mos.	7
All children	19 mos.	69

When groups of varying instruction time were analyzed there was no difference among IQ levels. An insufficient number of children prevented comparing of groups by age, sex and IQ and disability. However, instruction time was considered when the group of released students were analyzed as a whole.

As was expected the children who required the longest periods of instruction were those with the most severe learning problems. When an average rate of improvement per month was computed it was found that students requiring 31 months of instruction made less than half the progress per month of those who required 9-11 months of instruction. (See Table 19).

Table 19

Released Student Improvement by Month

Instruction Period	N	Average Rate of Improvement per Month
31 mos.	11	1.2 mos.
22 mos.	11	1.6 mos.
20 mos.	8	2.0 mos.
13 mos.	3	1.7 mos.
11 mos.	16	2.7 mos.
9 mos.	5	2.6 mos.

Fifty-nine of the 69 released students who had regular instruction periods were compared by rate of progress per month in the categories of sex, IQ, age, and disability. It was found that there was no difference in the rate of progress by sex. Each group improved an average of 2.1 months per month in oral reading ability.

Rate of improvement according to IQ showed that those children with IQ in the average range (90-109) appeared to make significantly more progress than those with IQs below 89. Children with IQs of 110-129 appeared to make significantly less progress than those children with IQs of 90-109. (See Table 20). Since this did not follow a normal pattern it was felt that some other variable was affecting progress rather than difference in IQ.

By observation dyslexics made significantly more progress than hyperkinetics. Children 10 years or older appeared to make significantly more progress than those from 7-9 years. Six year olds made progress equivalent to 10,11, and 12 year olds. (See Table 20).

Table 20

An Analysis of Progress By Sex, Disability, Age and IQ of Released Students

N=59	Sex		Disability		Age								
	Male	Female	Dys.	Hyp	6	7	8	9	10	11	12	13	14
N	41	18	46	13	5	11	5	5	13	5	7	5	3
Ave. Rate	2.1	2.1	2.3	1.6	2.1	1.7	1	1.7	2.4	2.1	2.1	2.9	3.5

	80-89	90-99	100-109	110-119	120-129	130-139
N	5	14	26	8	5	1
Ave. Rate	1.5	2.1	2.4	1.8	1.7	3.8

Since the type of disability appeared to make the most difference in a child's progress, data was further analyzed with pupils grouped as dyslexic or hyperkinetic. Data was considered by sex, age, and IQ. The number of dyslexics was 44, the number of hyperkinetics was 15. Overall, hyperkinetics made 1.7 months improvement per month and dyslexics made 2.3 months improvement per month. Dyslexic males and females progressed more rapidly than hyperkinetic males and females. There was a greater difference between hyperkinetic and dyslexic males than hyperkinetic and dyslexic females. The average IQ of the dyslexic was 105; the average IQ of the hyperkinetic was 99. There were no dyslexics with

an IQ of below 90 in the program. Five hyperkinetics were below 90 and only 1 fell into the 90-99 range. Dyslexics appeared to make generally better progress than hyperkinetics at all IQ levels. No significant difference in progress related to IQ was apparent within disability groups.

The most obvious difference in progress appeared with regard to age and disability. There was no significant difference between the groups for children in age ranges 6-9. After 9 years dyslexics made much greater progress per month than hyperkinetics. Data was also considered grouping males and females in the dyslexic category and males and females in the hyperkinetic category.

Table 21
A Comparison of Hyperkinetic and Dyslexic Released Students by IQ, Sex and Age

	IQ						Sex	
	80-89	90-99	100-109	110-119	120-129	130-139	M	F
N	5	1	4	3	2		12	3
Hyp	1.5	1.3	1.3	2.2	1.4		1.5	1.7
N		12	22	6	3	1	28	16
Dys.		2	2.5	1.9	1.8	3.8	2.4	2.1

	Age								
	6	7	8	9	10	11	12	13	14
N	2	4	3	0	4	0	2	0	1
Hyp.	1.4	1.9	.9		1.2		1.9		1.9
N	3	7	2	5	10	5	4	5	2
Dys.	1.9	1.6	1.3	1.7	2.6	2.1	2.4	2.9	4.3

No difference as to progress appeared between male and female dyslexics by IQ. Within groups (male and female dyslexics) IQ was not a factor in progress. Since the three hyperkinetic females possessed IQs below 90, hyperkinetic males and females were not comparable.

Although no differences were apparent between males and females by age, there was a striking difference between the progress of older and younger males compared with older and younger females. Males 10 years and above made much greater progress than those between the ages of 7-9. Incongruent with this pattern were the 2 children in the 6 year old category. Both exhibited a mild form of dyslexia. One was remediated in 4 months and the other in 11 months. Conversely there was no difference among females in average progress regardless of age group with the exception of one child in the 6 year category who was remediated in 11 months.

Table 22
A Comparison of Dyslexic Male and Female Released Students by IQ and Age

IQ	90-99	100-109	110-119	120-129	130-139
N	7	13	5	2	1
Male	2.1	2.7	1.8	2.1	3.8
N	5	9	1	1	
Female	1.8	2.3	2.9	1.4	

Age	6	7	8	9	10	11	12	13	14
N	2	4	2	2	7	3	2	4	2
Male	3.2	1.3	1.3	1.5	2.6	2.1	3	2.7	4.3
N	1	3	0	3	3	3	3	1	0
Female	1.1	2.0		1.8	2.8	2.2	1.7	3.6	

Although indications of patterns occurred, an insufficient number of children in each category prevented valid conclusions.

Of particular interest to staff was the beginning of a longitudinal study of released students' progress after dismissal. In most studies of remedial programs gains are reached during instruction but not retained after dismissal.

For the past two years data have been collected on students who were released from the 1967-68 program. Of the 15 students released 10 returned for retests in the summer of 1969. The average improvement without APSL instruction for 9 months after leaving the program 1 year. Two students made no improvement but maintained the reading levels achieved at the Center. Two students made greater than two years progress. Four students scored near the 10.0 level, the highest possible on the test.

Nine of the ten children returned in June, 1970 for their second retest. Average improvement of the group on the Gilmore Oral Reading Test was 6 months. The average progress of the 9 students who returned for testing both summers was 1.4 after release from the program. Three of the four students who achieved near the 10.0 level in 1969 maintained their progress. One student progressed to the 10.0 level. No students regressed significantly. One student absent in 1969 was measured in 1970. His progress for the two years out of the Center was 1.5 years. (See Table 23).

The grades of this group were analyzed for any improvement after entering the Perceptual Development Center program and being released. In the summer of 1970 a study of the 69-70 school year grades reported indicated a 5 point increase in scores. (See Table 23).

Fourteen of the 20 children released after the 1968-69 school year returned in June 1970 for retests. During the intermittent year none had received any special reading help. All students retained the level of reading skill with which they were dismissed, except 4, who regressed on the tests more than 3 months. One student made more than 2 years of progress.

This entire group showed a 5 point increase in grades. It was noted that the three who regressed when they came in for testing made improvement in grades during the 69-70 year.

Over a two year period then 24 students have returned for retests after release from the Center and intervening years work. Of this group 13 continued to improve in reading skills after dismissal, 7 retained their dismissal reading level and 4 regressed.

Table 23
Retests of Released Students 1967-69

Ent. Gr. Lev.	Pres. Grade Level	Inst. Per. APSL	Beg. Read. Level	Final Reading Level	Change	Retest 7/69	Change	Retest 6/70	Change	Total Change	Gr. Ave. Prior APSL	Gr. Ave. After APSL	Change
8	10	1 yr.	5.2	8.5	3.3	10.0	2.5	9.8	-.2	4.6	87 (B-)	90 (B) 95 (A-)	8+
6	9	1 yr.	5.8	8.4	2.6	8.5	.1	9.3	.8	3.5	76 (C-)	80 (C)	4+
6	9	1 yr.	5.3	9.1	3.8	9.4	.3	9.3	-.1	3.8	79 (C-)	88 (B)	9+
8	10	1/2 yr.	4.8	7.9	3.1	9.5	1.6	10.0	.5	5.2			
7	9	1 yr.	6.8	8.4	1.6	8.3	-.1	10.0	1.7	3.2	75 (D+)	81 (C) 83 (C+)	8+
6	9	1 yr.	5.9	8.9	3.0	9.9	1.0	9.6	-.3	3.7	79 (C)	82 (C)	3+
3	4	1 yr.	2.2	4.2	2.0	4.5	.3	5.6	1.1	3.4	82 (C)	82 (C)	0
7	9	1 yr.	3.5	4.9	1.4	6.0	1.1	7.2	1.2	3.7			
9	11	1 yr.	4.1	7.6	3.5	8.4	.8	8.7	.3	4.6	82 (C)	78 (C-)	-4
9	11	1 yr.	4.4	8.5	4.1			9.0	1.5	4.6	85 (C+)	87 (B-)	2+
**********													
7	8	1 yr.	3.8	9.6	5.8			9.6	.0	5.8	72 (D)		
6	8	2 yrs.	3.0	8.4	5.4			8.3	-.1	5.3	79 (C-)	83 (C+)	4+
8	10	2 yrs.	5.2	8.1	2.9			8.7	.6	3.5			
2	4	2 yrs.	1.5	5.7	4.2			6.3	2.1	4.8	64 (F)	82 (C)	18+
5	7	1 yr.	4.2	8.9	4.7			8.3	-.6	4.1	85 (C+)	84 (C+)	-1
7	9	2 yrs.	3.3	9.7	6.4			9.9	.2	6.6	83 (C)	89 (B)	6+
1	3	2 yrs.	.0	4.3	4.3			4.0	-.3	4.0	Below Ave.	77 (C-)	
2	5	2 yrs.	2.9	5.4	2.5			4.6	-.8	1.7	Ave. (80)	89 (B)	9+
5	8	2 yrs.	5.5	8.4	2.9			7.9	-.5	2.4	81 (C)	84 (C+)	3+
2	4	1 yr.	1.9	3.8	1.9			4.1	.3	2.2	Ave.	78 (C-)	
3	3	1 yr.	1.6	3.6	2.0			4.2	.6	2.6	90 (B)	78 (C-)	-12
5	7	2 yrs.	4.2	7.9	3.7			7.1	-.8	2.9	74 (D+)	81 (C)	7+
5	7	1 yr.	4.8	8.2	3.4			8.7	.5	3.9	75 (D+)	80 (C)	5+
7	9	2 yrs.	7.2	8.7	1.5			8.4	-.3	1.2	73 (D)	79 (C)	6+
2	3	1 yr.	1.5	4.4	2.9	5.7	2.8						

Released student data was analyzed for rate of progress before entering the PDC, during PDC attendance, and after dismissal from the PDC. Expectancy without specific intervention of this program was computed for each student as well as how much each student exceeded that expectancy. The average progress of this group of students in the regular classroom had been eight mon. per year (nine mon) with a range of from no progress at all to ten months. The average progress of these students while attending was 2 years and 7 months with a range of from eight months to 5.8 years. The average reading level of the group, had not intervention occurred, was computed to be fifth grade 8th month with a range of second grade 1st month to ninth grade fifth month. The group exceeded the optimum of what could have been expected for them if they had remained in a regular classroom by one year and five months. See table 24.

Table 24
Released Students
Results of Intervention

	Prog. Reg.	Prog. PDC	Exp. Read. Level w/o Intervention	Exceeded Expectancy
1	.7	3.3	7.3	2.5 yrs.
2	.8	2.6	8.2	1.1 yrs.
3	.8	3.8	7.7	1.6 yrs.
4	.6	3.1	6.6	3.4 yrs.
5	.9	1.6	9.5	.5 yrs.
6	.8	2.9	2.1	
7	.8	3.0	8.3	1.3 yrs.
8	.7	2.0	4.3	1.3 yrs.
9	.5	1.4	5.0	2.2 yrs.
10	.5	3.5	5.6	3.1 yrs.
11	.5	4.1	5.9	3.1 yrs.
12	.5	5.8	4.8	5.2 yrs.
13	.5	2.7	4.5	3.8 yrs.
14	.7	1.5	7.3	1.4 yrs.
15	.7	2.1	4.6	1.7 yrs.
16	.7	4.7	5.6	2.7 yrs.
17	.5	3.2	4.8	5.1 yrs.
18	0	2.2	?	?
19	1.0	1.3	5.9	-1.3 yrs.
20	.9	1.5	8.2	-.3 yrs.
21	1.0	1.9	3.9	.2 yrs.
22	.5	2.0	2.6	1.6 yrs.
23	.8	1.9	6.6	.5 yrs.
24	1.0	3.4	6.8	1.1 yrs.
25	1.0	.8	10.0	-1.6 yrs.
	.8	2.7	5.8	1.5

Program Variation 1969-70 Hour-A-Day

Hour-a-day class statistics for 69-70 are apparently irregular. Before court ordered integration in January 1970, 475 children were being served in

hour-a-day classes. After integration was effected 206 of these 475 children transferred to private schools or were relocated in the Natchez system. Because of transfer to buildings where APSL classes were not available at their grade level these 206 children were not able to receive this specific reading program during the second semester. Of this group some received private tutoring but approximately 25% were negro children who were unable to receive help in any way. Estimates of whites who failed to receive any help are unavailable since they were removed from the public schools.

Because of the large number of children in hour-a-day classes, statistics were broken down by age, sex, race, IQ and type of disability.

Eighty-one children receiving APSL instruction for 16-18 months (1968 and 69 school years) had an average age of 8 years; average IQ was 95; and the beginning reading level was 2.7. The total average change was 2.9. Analysis by sex, race, IQ, and age disability revealed the following results:

Table 25
Hour-A-Day Class Progress 1967-70

Sex	N	Av. Chg.		N	Av. Chg.	Total
White female	7	2.4	White male	18	3.4	2.9
Black female	16	2.8	Black male	40	3.0	2.9
Avg. female		2.6	Avg Male		3.2	Avg. 2.9

IQ	-70	70-79	80-89	90-99	100-109	110-119
N	3	5	19	32	18	4
Avg. Change	1.7	2.7	2.6	3.1	3.5	3.5

AGE	8	9	10	11	12	13	14	15
N	4	20	21	17	10	7	1	1
Avg. Change	2.0	2.8	3.1	2.8	4.0	3.5	2.9	2.5

Disability	Hyperkinetic	Dyslexic
N	25	56
Avg. Change	2.7	3.2

The next greatest instruction period was 13 months. (1968 school year and September-December 1969 school year). The 85 children comprising this group had an average age of ten years, and an average IQ of 96. The initial reading level was 3.0. The average total change in oral reading level was 1.8.

Table 26
Hour-A-Day Class Progress
Analysis by sex, race, IQ, age and disability revealed the following results:

Sex	N	Avg. Chg.		N	Avg. Chg.	Total
White female	15	1.6	White male	49	2.3	1.9
Black female	8	1.8	Black male	13	1.5	1.7
Average female	23	1.7	Average male	62	1.9	1.8

IQ	-70	70-79	80-89	90-99	100-109	110-119	120-129
N	0	3	11	35	32	3	1
Avg. Change		1.2	1.7	1.9	2.3	1.8	1.9

Age	8	9	10	11	12	13
N	7	22	29	14	10	3
Avg. Change	1.4	1.5	2.0	2.5	2.4	3.0

Disability	Dyslexic	Hyperkinetic
N	69	16
Avg. Change	2.1	1.6

A 9 month instructional period, group of 106, (various 9 month groups represented) with an average age of 9 years; average IQ of 91 and an average beginning reading level of 3.2, showed an average total change in oral reading level of 1.4.

Table 27
Hour-A-Day Class Progress

Analysis of this group by sex, race, IQ, age and disability revealed:

9 Months

Sex	N	Avg. Chg.		N	Avg. Chg.	Total
White female	14	2.3	White male	33	1.0	1.7
Black female	17	1.0	Black male	42	1.3	1.2
Average female	31	1.7	Avg. male	75	1.2	1.4

IQ	-70	70-79	80-89	90-99	100-109	110-119	120-129
N	5	10	25	42	19	4	1
Avg. Change	.9	1.5	1.3	1.5	1.5	1.7	3.0

Age	6	7	8	9	10	11	12	13	14	15
N	4	15	10	28	18	22	4	3	0	2
Avg. Chang.	1.6	1.8	2.1	1.5	1.1	1.6	1.5	1.9		1.7

Disability	Dyslexic	Hyperkinetic
N	58	48
Avg. Change	1.8	1.3

The group of less than 9 months instructional time (average in time 4 months; range 3-6 months) included 117 children with an average age of 9: an average IQ of 94. Their initial reading level was 3.5. The average total change in oral reading level of this group was 1.2.

Table 28
Hour-A-Day Class Progress
Less than 9 mos.

Analysis of the group by sex, race, IQ, age and disability is as follows:

Sex	N	Avg. Chg.		N	Avg. Chg.	Total
White Female	19	.8	White Male	41	1.1	.9
Black Female	17	.7	Black Male	40	2.4	1.5
Avg Female	36	.7	Avg Male	81	1.7	1.2

IQ	-70	70-79	80-89	90-99	100-109	110-119	120-129
N	2	10	25	39	28	10	3
Avg. Change	1.3	.9	.8	.9	.8	1.5	1.2

Age	6	7	8	9	10	11	12	13	14
N	1	22	21	23	21	16	10	2	1
Avg. Change	.6	.8	.8	.9	.8	1.2	1.1	.9	1.4

Disability	Dyslexic	Hyperkinetic
N	72	45
Avg. Change	1.0	.8

Teacher and principal evaluations of these hour-a-day classes are presented in Tables 30 and 31

Hour-A-Day Released Students

In 68-69, 34 children were released from hour-a-day classes. In 69-70 28 were released. This figure does not include those children who may have been ready if they had not been transferred in January to schools without APSL programs. No attempt was made to retest the released students from the hour-a-day classes since they were not a part of the original experimental design.

Table 29
Summary Hour-A-Day 1969-70

Instruction Time	N	Av. Age	Av. IQ	Beg. Read. Level	Change	Avg. Read. Level Ending
16-18 mos.	81	8	95	2.7	2.9	5.6
13 mos.	85	10	96	3.0	1.8	4.8
9 mos.	106	9	91	3.2	1.4	4.6
Less 9 mos.	117	9	94	3.5	1.2	4.7
(Avg. 4; range 3-6)						

Hour-A-Day classes in APSL for dyslexics and hyperkinetics made a significant difference in the reading skills of these students. Age, IQ and sex did not seem to be highly significantly correlated to progress. Type of disability (dyslexic or hyperkinetic) revealed a 5 month greater progress for dyslexics than hyperkinetics in all instruction time group over 9 months.

Table 30
Hour-A-Day Teacher Questionnaire

1. Are you satisfied with the improvement of your class in the following areas;

	Reading, Writing and Spelling Combined	Reading	Writing	Spelling
	68-69		69-70	
Yes	67%	100%	100%	70%
No	17%			30%
No Response	16%			

2. a. Did you find the material easy to follow?

	68-69	69-70
Yes	100%	100%
No	0%	
No Response	12%	

b. Is the teacher's manual specific?

Yes	83%	100%
No	4%	
No Response	13%	

c. Does the structure of the material make teaching "these children" easier?

Yes	79%	100%
No	0%	
No Response	21%	

d. Did the APSL summer training course help?

Yes	100%	90%
No		
No Response		10%

e. Do you have any suggestions to make the course more helpful?

Yes	33%	50%
No	25%	50%
No Response	42%	

3. a. Do the volunteers really help?

Yes	71%	70%
No	0%	20%
No Response	29%	
No Vol.		10%

b. Would you prefer to teach the students from APSL without volunteers?

Yes	4%	30%
No	54%	70%
No Response	42%	

4. Do you wish to continue to use APSL with students who are dyslexic?

Yes	67%	100%
No	8%	
No Response	25%	

5. a. Were you satisfied with the way parents were notified of the class at your school?

Yes	58%	50%
No	17%	40%
No Response	25%	10%

b. Would you like more contact with the parents to explain the program?

Yes	50%	90%
No	25%	10%
No Response	25%	

c. Do you think a parent should be required to volunteer for his child to be in the program?

Yes	29%	20%
No	50%	70%
No Response	21%	
If Capable		10%

6. Do you think APSL classes were improved this year? (This question was added in 1969-70)

	69-70
Yes	60%
No	10%
No Response	30%

7. Did you have sufficient guidance or assistance from the Perceptual Development Center? (This question was added in 1969-70)

	69-70
Yes	90%
No	10%

8. Were Testing services adequate?

Yes	90%
No	10%

Table 31
Principal Evaluation of APSL Class

1. What did you expect this class to accomplish?

In general, the principals of each school where the APSL program was used wanted this program to assist the students in achieving better reading skills, better writing skills, and better phonic skills.

The principals also felt that this program could change overall attitude toward school and could instill self-confidence. One principal expressed the desire that this program could cut down on school drop-outs.

(The answer to question number 1 was basically the same for the 1967-68 and 1969-70 school terms.)

2. Did the class accomplish what you wanted it to?

	68-69	69-70
Yes	80%	80%
No	13%	10%
No Response	7%	10%
N	14	10

3. Should this class be done during the regular reading period?

Yes	53%	60%
No	20%	30%
No Response	27%	10%

4. How often does the class meet?

5 days	80%	60%
4 days		
3 days		10%
2 days		10%
1 day		
Other: 3-5 days		10%
No Response	20%	10%

5. How much time is allowed per session?

	68-69	69-70
45 min.	50%	10%
1 hr.	21%	50%
1 1/4 hr	14%	30%
1 1/2 hr	15%	10%
No Response		

6. (The categories which appeared on the 1969-70 form were taken from responses on the 1968-69 form. Percentages were not computed then.)
What problem (s) did you encounter with APSL class?

	69-70
Teacher-student ratio inadequate	60%
Difficulty in making certain no student missed regular classroom work	50%
uncooperative parents of students entering APSL program	30%
Delay in getting APSL material	0%
Teacher Qualifications	10%
Others	30%
No response	10%
9 of 10 checked more than one response	

7. Has your teacher been pleased with the results of the class?

	68-69	69-70
Yes	80%	80%
No	13%	10%
No Response	7%	10%

8. Have you been able to use volunteers?

	67%	50%
Yes	33%	40%
No		10%
No Response		

9. Have the volunteers interferred in any way with the operation of the school program?

	20%	60%
Yes	60%	40%
No	20%	
No Response		

10. Do you feel the volunteers have done the job they were supposed to?

	60%	50%
Yes	0%	0%
No	40%	50%
No Response		

11. Was the testing program adequate (Check if yes)-(This question was added 69-70)- (21 principals checked more than one response.)

	69-70
The time of testing was conveniently arranged	60%
The examiners were cooperative	60%
Testing was thorough	50%
Results were explained in detail	40%
After you received results of testing, did you receive adequate assistance in setting up classes, if desired	70%
Other	30%
No Response	

12. Overall do you feel the program has been successful?

	68-69	69-70
Yes	87%	90%
No	0%	
No Response	13%	10%

Observation

Over the three year period 375 observers visited the Perceptual Development Center. These observers were from such diverse locations as Texas, Louisiana, Idaho, California, Florida, Alabama, Arkansas, Indiana, Ohio, Georgia, New Mexico, Illinois, Washington, D.C., Tennessee.

Some groups returned for several observations and 16 programs have been initiated as a direct result of the Perceptual Development Center staff's aid to other school districts. These are: Woodville, Miss.; Franklin County, Miss.; Ruleville, Miss.; Monticello, Miss.; McComb, Miss.; New Albany, Indiana; Concordia Parish, La.; Shreveport, La. (Caddo); Kiroli School, Monroe, La.; Florence, Ala.; Hope, Ark.; Tallulah, La.

Observers' evaluations of the program are detailed in the following questionnaire which was sent out from 68-70.

Table 32

Observers Evaluation

1. Did you have enough time in your visit to observe the entire program?

	68-69	69-70
Yes	75%	82%
No	25%	18%
N	45	49

2. Did you feel your observation tour was thorough?

Yes	91%	92%
No	6%	6%
No Response	3%	2%

3. Was the material used (APSL) and why it is used with dyslexics explained thoroughly?

Yes	100%	96%
No	0%	4%

4. Did you feel you got a good overview of the goals of the Perceptual Development Center program and how they are being met?

	68-69	69-70
Yes	91%	100%
No	2%	0%
No Response	7%	

5. What was your impression of the program?

Strongly favorable	42%	71%
Favorable	55%	27%
Undecided	0%	0%
Unfavorable	0%	2%
Strongly Unfavorable	0%	0%

3. To Provide In-Service Training for Teachers in the Area

Eleven workshops and in-service training programs have been offered by the Perceptual Development Center for teachers in the Counties of Adams, Wilkinson, Franklin, Amite, Claiborne. The number of teachers reached by workshops and in-service training is approximately 644. There were some teachers taking more than one course. The following chart details each workshop and in-service course.

Table 33
Teacher Workshops and In-Service Training Courses
1967-70

	Date	Speaker	No. Teachers Attending	Purpose
1	Aug., 1967	Dr. Chas. Shedd, U. of Ala. Med. College, Birmingham Ala. / Miss Angie Nall, Angie Nall School for Educational Retraining, Beaumont, Texas	200	Introduction of Learning Disabilities Field and Dyslexia
2.	Nov.,67-Feb., 68	Dr. Etoille DuBard U. of Southern Miss.	50	Acquaint teachers with all language disorders
3.	June, 68	In-Service at PDC Jones	25	Teach APSL material to 50 teachers so that program could expand to all schools in Sept., 1968
4.	July, 68	Jones lecture, 3 hrs. work with dyslexics	25	
5.	July, 1968	Dr. Chas. Shedd	50	Introduce learn disabilities to teachers who had not had course in 67-Include Amite County
6.	June 69	In-Service Training Course at PDC. Jones lecture and actual work with dyslexic students.	27	Train additional teachers in problems of dyslexia and material available for instructing.

Date	Speaker	No. Teachers Attending	Purpose
7.July 69	(Same as June 69)	27	
8. July 69	In-Service Training in in testing (Miss A. Harvey, PDC Test. Supervisor	20	Train 1 teacher in each school to give the dyslexia test battery so that 1. testing can be carried on after the grant period. 2. immediate testing can be done as needed.
9. July 69	Symposium on learning Disabilities-Mrs. Jones Dr.Frierson, Mr. Flowers Dr. Shedd	160	Further information for all teachers on learning disabilities.
10. Sept.69	Dr. Sylvia Richardson	40	Address on learning disabilities from medical standpoint to 1. teachers 2. doctors (20)
11.June 70	In-Service Training in Testing. (Miss Harvey, Supervisor of Testing)	20	Reinforce and continue training begun with testing teachers Summer 1969
Total	11 workshops and in-service training courses	644	

Evaluation reports by teachers at these workshops are seen in the following charts:

Table 34
In-Service Training Course
Evaluation

1. Do you think you can recognize for referral a student with the specific reading disability, dyslexia? Yes-25 (100%) No-0 (0%)
2. Do you think you thoroughly understand the problems of the dyslexic child in the regular classroom? Yes-19 (76%) No-6 (24%)
3. Did you notice differences in the behavioral characteristics and learning abilities of the three students to whom you were assigned?
Yes-25 (100%) No-0 (0%)
4. Do you understand the Alphabetic-Phonetic-Structural-Linguistic Approach to Literacy method of teaching reading?
Yes-25 (100%) No-0 (0%)
5. Do you feel you can begin to effectively use this material in your classroom?
Yes-22 (88%) No-2 (8%) No Answer-1 (4%)
6. Evaluate your Dyslexia In-Service Training Course at the Perceptual Development Center. Note the strengths and weaknesses of this course.

Strengths		Weaknesses	
Understand children better	13 (52%)	Does not feel prepared	-1 (4%)
Be a better teacher	10 (40%)	Did not show teachers enough on teaching regular school session	-1 (4%)
Help recognize dyslexics	8 (32%)	On first day be assigned to watch a classroom rather than teach	-1 (4%)
Many ideas and methods for helping dyslexics	6 (24%)		
Excellent instructor and staff	6 (24%)		
Very thorough	6 (24%)		
Help slow learners	5 (20%)		

Auditory very important	3	(12%)
Enjoyed using materials with different children with varying problems	1	(4%)

No Answer: 1 (4%)

Table 35
In-Service Testing Course Evaluation
68-69

Do you think you can recognize and help other teachers in your school recognize for referral a student with the specific reading disability, dyslexia?

Yes-31 (100%) No-0 (0%)

Do you think you thoroughly understand the problems of the dyslexic child in the regular classroom?

Yes-21 (68%) No-9 (29%) Undecided-1 (3%)

Do you feel you can adequately administer the dyslexia test battery?

Yes-31 (100%) No-0 (0%)

Do you feel you can adequately evaluate the dyslexia test battery?

Yes-24 (77%) No-6 (19%) Undecided-1 (3%)

Evaluate your Dyslexia Testing In-Service Training Course at the Perceptual Development Center. Note the strengths and weaknesses of this course.

Strengths			Weaknesses		
Thorough, well-planned	6	(19%)	more time	12	(39%)
Actual administration and evaluation of tests	6	(19%)	more evaluation	7	(23%)
Help Children	3	(10%)	more testing	5	(16%)
Help other teachers	5	(16%)	more scoring	3	(10%)
Insight into people with Problems	3	(10%)	need small groups	3	(10%)
	4	(13%)			

Table 36
To Educate the Public to the Problem of Dyslexia

An approximate number of speeches, TV and radio appearances, workshops for volunteers and newspaper articles is detailed below:

	67-68	68-69	69-70	Total
Newspaper	63	74	63	200
Radio	4	17	0	21
TV	2	2	0	4
Speeches	46	15	41	102
Volunteer Workshops	20	52	21	93
Requests for Information	285	238	123	646

Results of these attempts to educate the public were evaluated through the following questionnaires:

Table 37
Volunteer Activities

Number of volunteers in programs at Perceptual Development Center in Adams, Franklin and Wilkinson County:

Perceptual Development Center	110
Braden School	12
Carpenter #2 School	8
Central	2
Montebello Jr. High	26
Montebello Elementary	27
Morgantown Elementary	16
Northside	32
Prince St.	4
Washington	37
Cathedral	20
Franklin and Wilson Counties	4
Grand Total	298

Table 38
Volunteer Form

1. Have you learned anything from the APSL Approach to Literacy series?

	1967-68	1968-69	1969-70
Yes	100%	100%	96%
No	0%	0%	4%
N	24	52	50

2. Do you think this method has had any beneficial effect on your students?

Reading

Yes	100%	98%	96%
No	0%	0%	0%
Undecided	0%	0%	4%
No Response	1%	2%	0%

Writing

Yes	83%	87%	78%
No	4%	2%	4%
Undecided	12%	0%	10%
No Response	1%	11%	8%

Spelling

Yes	83%	92%	94%
No	4%	0%	0%
Undecided	8%	0%	2%
No Response	5%	8%	4%

3. Did your student show any signs of rebellion against this material or program?

Yes	46%	33%	14%
No	50%	63%	82%
Undecided	4%	4%	4%

4. Have you seen any change in his attitude as the program progressed?

Yes	71%	79%	62%
No	29%	19%	11%

Undecided	0%	0%	17%
No Need to Chg.	0%	0%	6%
No Response	0%	2%	4%
5. If change occurred, was it		1969-70	
Strongly positive		15%	
Positive		48%	
Negative		0%	
Strongly Negative		0%	
No response		37%	
6. What age child do you instruct?		1969-70	
6-8 years		22	
9-12 years		22	
13-16 years		15	

A random sample of the community was sent an evaluation letter of the Perceptual Development Center program in May 1969 and May 1970. A table showing the results of this inquiry is presented below:

Table 39
Random Population Response Attitude Questionnaire

1. Are you aware that there is a program in the school system for children with the specific reading disability, dyslexia?

	68-69	69-70
Yes	92%	90%
No	7%	10%
No Response	2%	
N	61	60

2. How did you find out about this program?

Newspaper	49%	32%
Teachers, School Officials, Volunteer workers	21%	30%
Students	8%	9%
Parents	3%	17%
Others	9%	9%
No Response		3%

3. Do you feel this program is needed?

Yes	97%	89%
No		1%
Don't Know	2%	9%
Undecided		1%
No Response	8%	

4. Do you feel this program is successful?

	68-69	69-70
Yes	85%	57%
No	0%	3%
Don't Know		20%
Undecided		3%
No Response	15%	17%

	68-69	69-70
*Very Successful		43%
Successful		14%
Unsuccessful		
Very Unsuccessful		

*This breakdown was not done until the 69-70 Questionnaire

5. Do you feel this program is helpful to the community?

	68-69	69-70		68-69	69-70
Yes	92%	74%	*Very Helpful		52%
No	0%	3%	Helpful		3%
Don't Know	5%	6%	Harmful		
Undecided		2%	Very Harmful		2%
No Response	8%	15%			

*This breakdown was not done until the 69-70 Questionnaire

Consultant opinion of the Perceptual Development Center's attempt to meet its four major goals is listed in the following chart:

Table 40
Consultant Questionnaire

From your contact with the Perceptual Development Center program or individuals being served by the program, do you feel that the project is fulfilling each goal:

1. To set up a demonstration center for the teaching of dyslexic children and observation by teachers. Yes-13 (100%) No-0 (0%)
2. To set up a diagnostic program to determine dyslexic children in the area. Yes-13 (100%) No-0 (0%)

COMMENTS: (1) Staff co-operative when need testing
(2) Sorry could not take more time to observe
(3) Natchez-2,858 children have been tested

3. To provide in-service training for teachers in the area Yes-13 (100%) No-0 (0%)

COMMENTS: (1) Franklin Elementary used high school students
(2) Beneficial (Centreville)
(3) Need more notice and more teachers would have taken advantage of it
(4) Natchez-600 teachers have attended course

4. Educate the public to the problem of dyslexia. Yes-11 (85%) No-1 (8%) Undecided-1 (8%)

COMMENTS: (1) Aware of program, but does not understand it
(2) Did excellent job of helping children
(3) Excellent job
(4) Needed more assistance
(5) More learning disability workshops involving speakers in this field.

CONCLUSIONS:

An Analysis of the Innovative Material

The material could only be analyzed, as any material, by actual usage. In teaching APSL the Perceptual Development Center staff had carefully evaluated the merit of this new material in improving the reading skills of dyslexics.

A method to teach dyslexics had to be alphabetic, phonetic, structural, and linguistic because the dyslexic did not "see" the structure and pattern of the language. The associations that the normal reader made were rarely made by the dyslexic. He had to be taught step by step.

Most methods included some of these factors but not all of these approaches. Alphabetic-Phonetic-Structural-Linguistic Approach to Literacy also utilized the multisensory approach. This use of all the senses for learning was vital for the dyslexic. Since the student with dyslexia had poor visual-motor perception and poor auditory discrimination, it was important that he learn through not only sight and hearing, but also through tactile and kinesthetic stimulation. In this way the dyslexic learned, through four senses, therefore what he saw and heard was reinforced by movement and touch.

In the Introductory Book of APSL these students were taught all of the alphabetic and phonetic information of the English language. (1) The name of each letter (2) Proper formation in writing each letter (they needed much supervision in the beginning or they formed letters in the wrong direction and "set" poor writing habits) (3) The sound of each letter (4) Voiced-unvoiced information about each sound (5) Differentiation of vowel and consonant (6) Visual-discrimination of the printed and cursive lower case and capital letter (7) The sequence of the letters in the alphabet (8) How to sound letters in words (9) How to spell simple words (10) Auditory memory by sentence dictation (11) Directionality of the language (12) How to break down simple words with the sounds and word families being taught.

The material in the Introductory Book taught the pattern and structure of words to the student and the dyslexic began to "see" how to attack the language.

"Here is the beginning sound (which he has learned as detailed above). a
Here is the unvoiced consonant. t
Put them together - at
Now we have built a word family. This is a unit of language on which we can build many other words by adding beginning consonant sounds -
b at
c at
d at This is not a real word. We will not use it.
f at
h at
m at
n at
p at
r at
s at
v at

Beginning sounds + word families make words."

The student was carefully taught each sound of the language and each word family. He learned to read, write and spell hundreds of words to which this pattern could be applied. These words did not have to be memorized. Irregular words (introduced much later) had to be memorized, but all patterned words were taught first in APSL.

One reason APSL helped these dyslexic students where other methods do not succeed was seen in a second grade spelling list:

desk	put
fish	shall
pat	was
hot	run
tan	ram
set	saw

It was noted that no two words ended in the same word family, very few began with the same beginning consonant sound. Since there was no pattern evident here, the list had to be memorized. The normal reader "saw" the similarities in words. He "saw" that pat, sat, and cat looked alike and sounded alike in part. The dyslexic child "saw" in wholes and very rarely found these similarities and used them in spelling, reading and writing. He could be taught if the material were presented in such a way that he could master the patterns.

In the Introductory Book, then, all of the consonants and short vowel letters and sounds were taught to the child. He was shown how to put these together to make words built on word families. He was taught to decode our language.

1. He saw- c a p
2. He couldn't read it.
3. The teacher said, "What is the beginning consonant sound?" c(k)
4. "What was the word family?" -ap
5. "Now put it together."
6. "Call it." -cap
7. "What does cap mean?"

In Book I each consonant blend of the language was taught. These were bl, cl, fl, gl, pl, sl, spl, br, cr, dr, fr, gr, pr, tr, scr, shr, spr, str, sc, sk, sm, sn, sp, st, sw, tw, squ, qu.

Each consonant digraph was taught. These were ch, sh, th[1], th[2], wh

Each word family was taught: ab, eb, ib, ob, ub, ack, eck, ick, ock, uck, ad, ed, id, od, ud, ag, eg, ig, og, ug, am, em, im, om, um, an, en, in, on, un, and, end, ind,ond, und, ang, ing, ong, ung, ank, ink, onk, unk, ant, ent, int, unt, ap,ep, ip, op, up, ash, esh, ish, osh, ush, ast, est, ist, ost, ust, at, et, it, ot, ut, atch, etch, itch, otch, utch, aff, iff, off, uff, all, ell, ill, oll, ull, ass, ess, iss,oss, uss, act, ect, ict, uct, adge, edge, idge, odge, udge, aft, eft, ift, oft, uft, amp, emp, imp, omp, ump, ance, ence, ince, unce, anch, ench, inch, unch, apt, ept, ipt, ask, esk, isk, usk, asp, isp, usp, ath, eth, ith, oth, uth, ax, ex, ix, ox, ux, ext.

At the end of Book I the student could read, write and spell 4,000 words based on the pattern:

Beginning consonant sound + word family
consonant blend + word family
consonant digraph + word family
As in the original word family bat flat chat

In Book II the student learned the rules of the English language which applied to these patterns of the language, such as:

1. CVC rule-when you have a word which fits the pattern consonant-vowel-consonant the vowel is usually short. Example-fat
2. The "magic e" added to a CVC pattern word changes the vowel from short to long (The e is not really silent-it serves a purpose) Example fate
3. The k sound after a short vowel is usually spelled ck. Example kick

Every rule which showed a pattern of the language was taught with many word examples, and the words were used in sentences for reading material. Every mistake made in reading, writing or spelling was written correctly on sandpaper with the fingers, then on paper with a pencil. Each rule was pointed out repeatedly in meaningful reading material where it applied.

After all of the pattern rules were taught, exceptions of the language were taught. For example: "tion is a pattern in the language when says "shun". It is not spelled the way it sounds. It is in such words as: action faction reaction attraction-etc."

These words were then presented in sentences. In this way each exception of the language was taught. At the end of Book II 8,000 words of the language should have been mastered.

Book III dealt with higher language forms and completed freshman college material. All of the structural and linguistic material was completed in this book. When the student completed the series he had been presented all of the alphabetic and phonetic information of the language in a structural presentation and a completely linguistic breakdown of the language from the simplest unit. Beginning with the phoneme the method proceeded to the more complex forms which were patterned and which were exceptions.

Vital to the APSL method was auditory discrimination which paralleled the APSL manual in a series of drills, training the student to hear and identify beginning, middle and ending sounds in words, word families, words and word families that are different than others and different short vowel sounds. This training improved spelling and reading.

Through APSL dyslexics learned to deal with the language so that they could effectively read, write and spell. Without special training they might have compensated for a great many of their problems, but never would they have fully understood and dealt with the language as effectively as they could after the special training.

A 3-year study of specific testing and clinical management for dyslexic and hyperkinetic children has been presented. The clinical management was investigated in various presentations in a Center full-day program and hour-a-day classes both with individual volunteer help and with a teacher to regular class ratio.

The tests utilized for specific identification of these diagnostic categories

were the battery suggested by Dr. Charles Shedd and the program of clinical management of this same researcher was demonstrated. The program is the Alphabetic-Phonetic-Structural-Linguistic Approach to Literacy using a multi-sensory approach and one-to-one instruction wherever possible. This individual instruction was by para-educational personnel under the careful supervision of a skilled supervisor.

*The results indicate that dyslexics and children with related disorders can be identified in a school system by a screening program using a Supervisor of Testing and trained teachers to assist in the administration of the battery.

*The results further indicate that when these students are identified in a school they may be dealt with effectively by the use of para-educational personnel utilizing a specific highly structured material under careful supervision of a skilled supervisor. The hyperkinetic child seems more often to need a full-day program with more time in the material and more work on comprehension skills and math than the dyslexic. Most dyslexics seem to do quite well when removed from the classroom only for the specific reading program and allowed to remain in the regular classroom for other school work, as in the demonstration hour-a-day classes. Student progress does seem related to the individual and intensive attention he received in one-to-one sessions, however significant progress was observed in hour-a-day classes in which a teacher to 25 children was offered. This fact seems to lead generally to the conclusion that the material is critical in the dyslexics improvement in reading and that the individual session, of course, allows for more rapid progress.

*The study does demonstrate that programs which are economically feasible[1] and which reduce treatment time[2] through the utilization of specific procedures using para-educational personnel under supervision may be instituted in the on-going educational program.

1-All hour-a-day and county classes were set up by regular school personnel and supported entirely by local funds, not by the grant.

2-Students made 2 to 4 times the progress in APSL as they had gained in average previous program in which they had been taught. Almost all the Perceptual Development Center students had been tutored privately and received traditional remedial reading, both without lasting benefit in the opinion of the parents and their teachers.

SECTION IV COMMENTS ON ALLERGIES IN THE PERCEPTUAL DEVELOPMENT CENTER POPULATION

1. Related Studies

In day to day working with this large group of dyslexic and hyperkinetic children, it was noted that it seemed an unusually high per cent of the children suffered from allergies. It was wondered if allergic reaction could account for any of the variability of performance seen by this population in the classroom.

Crook (Speer, 1963, pp. 329-341) has reviewed the allergy-tension-fatigue syndrome and noted the behavioral problems frequently seen in these children, even when no other classic symptoms of allergy such as hayfever, asthma or eczema is present. Fluctuating hearing loss and serous otitis media so often associated with upper respiratory infection is increasingly felt to be due to allergic causes. (Fontana, 1969). These children are often missed because of the variability of symptoms. Both these authors suggest a high index of suspicion on the part of physicians may result in diagnosing the underlying disorder as an allergic reaction and appropriate treatment can then be instituted.

During the June, 1969, Summer Session, Donald Killelea, M.D., Medical Consultant to the Perceptual Development Center Program and his laboratory technician ran, with parent permission, a peripheral blood smear and a nasal smear on 79 students attending the Center. Of these, 48.1 per cent had positive nasal smears for eosinophiles and 45.4 per cent had peripheral eosinophilia of 5 per cent or greater. These two parameters are generally felt to point to an allergic background when positive. It was noted that late June was past the season in this section for most severe allergic reactions to occur and the question was raised, "Would these percentages be increased if the same laboratory tests were performed during the spring and fall months when the pollen level is said to be higher?" In any event, this high figure was of interest because the incidence of allergy in the pediatric population, in one form or another, is usually reported to be up to 25 per cent. (Fontana, 1969)

A parent questionnaire taken by a Perceptual Development Center staff member revealed that 76.4 per cent of these 79 children had family histories of allergy. Another interesting finding revealed only 19.7 per cent of the children had positive histories of allergy as answered on the questionnaire. Of these, 14 had hayfever-like symptoms and one had asthma. However, 48 per cent were described as fussy babies, or with frequent milk changes, or with frequent colds, as colicky, had skin rashes, ear infections, or asthmatic bronchitis during infancy.

No attempt was made by the Perceptual Development Center or the medical consultant to prescribe for those children as a group who were felt to have

an allergic diathesis. However, the parents were advised to check with their family physician or pediatrician for any further diagnostic evaluation or treatment.

A number of these children were in the private practice of the medical consultant and for these, antihistamines were prescribed. Also the mother was instructed in environmental house dust control and a modified foor elimination program was instituted. Arrangements were made with an allergist for scratch testing of those that seemed the most severe. Even with those children whose pollenosis was not being treated by hyposensitization shots, it was generally noted by the educational and testing staff of the Center that the children seemed to improve in auditory discrimination after attention to these details had been followed through. It was further felt that variability of performance for some of these students might then lie in allergic reaction and that more detailed study of these students in this area would be strongly indicated.

2. Comments on Medication

For the first year and a half of the program, consideration was given to any type of medication in addition to the education program. It was felt by the staff that a highly structured program with specific instruction would help each student gain skills and result in a less distractible, more attentive student.

With the majority of the students this supposition was found to be true. When a program was geared to their needs and the expectations realistic, the restlessness, daydreaming, and inattentiveness seen in a regular classroom began to fall away. For a few, changes were dramatic, but in most cases the changes were slowly brought about as successes grew.

In a few children a "non-direction of attention" even on a one-to-one basis of instruction was noted. It appeared to the teacher that even though the child wanted to learn and tried very hard he simply could not "focus" or direct his full attention to one stimulus long enough to permit learning to take place. Motor imperception was noted in all of his performances. For example, his eyes constantly fell on the stimulus and moved away to other objects, then back, then away, etc.

During this same year, Shedd suggested that there were at least two categories of students in our population - the dyslexic and the hyperkinetic. Not all of these hyperkinetic children were seen to be the extremely hyperactive child associated with frank brain damage.

The hyperkinetic, as cited before was identified on the test battery as having a separate pattern of performance including more difficulty with Gestalts, more fine motor and gross motor difficulties, greater problems in spacing, affected math skills and comprehension problems. In the classroom he was the child with the "seemingly uncontrollable inattention phenomena."

It should be mentioned that in the relatively small number of the students at the Center for whom complete neurological work-ups, including EEGs were recommended, most were found to have "no obnormal findings", but "slight dysrhythmic patterns."

Neurological examinations were not recommended in all cases because the nearest Center for these tests required a trip of 100 miles, because of the expense involved, and the neurological consultant's view that little, if any, educational benefit could be derived from this information.

Toward the end of 1968 several of the "inattentive children" were referred to the medical consultant for medical tests of general physical health and general neurological development. For these children who were not making the progress of others in the program he prescribed medications. A review of drug therapy suggested the medications used.

Dextroamphetamine (Dexedrine) is a very useful drug for hyperkinetic impulse disorders. (Millichap, J. G.). Side effects - loss of appetite, sleep disturbances, and facial changes should be explained carefully. In addition, the parents should be reassured that the drug is not habit-forming. As a precaution, however, amphetamines should probably not be prescribed to children past the age of 12 or 13.

If Dexedrine is unsuccessful, methylphenidate (Ritalin) is frequently used. This agent is considerably more expensive, however. Thioridazine (Mellaril) can be used when aggressive and destructive tendencies are evident. Chlorpromazine (Thorazine) and prochlorperazine (Compazine) also are of value, and diphenhydramine (Benadryl) is excellent, particularly in children less than 10 years of age. Anticonvulsant drugs are worthy of trial, especially if the electro-encephalographic reading is abnormal. (Gerald Solomons).

Emphasizing the use of drug therapy in perceptual disorders need not be construed as a laissez-faire approach to all learning and behavioral deviations. Definitive pediatric and psychologic diagnosis of this entity of faulty neurologic integration is the sine qua non for effective results with it. Clear-cut evidence of the syndrome must be pinpointed through careful clinical observations and requisite psychologic testing. There is no gainsaying that, at the very outset, a thorough physical and neurologic examination is the physician's responsibility, and recourse to specialized consultation (ophthalmolgic, auditory, speech, EEG, etc.) is mandatory when indicated. Promiscuous use of a drug for a variety of school and behavior disorders, without a definitive diagnosis, would be shortsighted and inappropriate.

No attempt was made to run a drug management study at the Perceptual Development Center. However, in the children for which the medical consultant prescribed medication general improvement was noted in classroom performance in all cases. In several children the changes were dramatic and more progress was attained after medication than in all of the previous instruction time for these students.

The feeling of the Perceptual Development staff and medical consultant remains that a structured specific educational program is necessary for increased academic skills for dyslexic and hyperkinetic children. The concensus is now that after placement in such a program for approximately 6 months, if the child still evidences great problems of attention that medication under careful medical supervision be investigated.

Related Findings and Additional Investigations

PRELIMINARY INVESTIGATION

One out of every two children entering the first grade in Natchez-Adams County Public School System can be expected not to adequately complete first grade work. A study by the elementary supervisors of the Metropolitan Readiness Test (1969-1970) on first year students revealed that 23.2% of the kindergarten children with experience, 57.8% of the children with Headstart experience and 75.8% of the children with no pre-school experience were high risks for learning tasks. (See Table 41). Expectancy in terms of a normal distribution would yield only 15%. High risks were defined as those children scoring below average on standard achievement tests.

TABLE 41
METROPOLITAN READING TEST RESULTS - FORM A

September, 1969 — First Year Students

Population	Enrollment		Superior		High Normal		Average		Low Normal		Low	
	#	%	#	%	#	%	#	%	#	%	#	%
Total	745	100%	39	5.2%	84	11.3%	220	29.5%	275	36.9%	127	17.1%
					High Academic Risk TOTAL 402 - 54%							
HS	257	34.6%	4	1.6%	9	3.5%	95	36.9%	103	40.1%	46	17.9%
K	220	29.6%	32	14.5%	57	25.9%	80	36.4%	47	21.4%	4	1.8%
NONE	266	35.8%	1	.4%	18	6.8%	45	16.9%	125	47.0%	77	28.9%

Though kindergarten and Headstart reduced the risk of failure for the first grader, quite obviously they were not enough. On the basis of the readiness test it was seen that 54%, or 402 children out of 743 first year students, were high risks for completing first year requirements.

Achievement tests at the end of the 68 - 69 school year revealed 62.2% had not achieved all of the first year requirements. (See Table 42)

TABLE 42
COMPARISON OF BELOW SCORES ON THE
METROPOLITAN READING AND READING ACHIEVEMENT TESTS

September 1968 & April 1969 — First Year

	Total Enrollment	Low #	Normal %	Low #	%	Total Below Average #	%
Readiness September, 1968	793	312	39.3%	146	18.4%	458	57.8%
Achievement April, 1969	817					Below Grade Placement 508	62.2%

In Natchez the administrative structure for the first three grades is the primary unit. The unit is broken down into twelve learning levels ranging from Readiness to enrichment 3rd. In an ungraded primary unit a child who has not attained proficiency in skills required in the first year proceeds with these skills in the second year. This process continued for as long as necessary for the child to attain skills required in the primary unit. Any retention to the primary unit results in additional time and training of the children and increased staff, thus increasing the cost of education.

The cost at current rates in Natchez-Adams School System for retaining per student which is $495.00 raises the education cost to a conservative estimate of $148,500.00 a year for those who do not complete all of the first year requirements. If objectivity were applied to these children's academic achievement, who can estimate the cost ultimately in welfare, crime, mental illness, social disruption and disorganization as a consequence of failure to effectively meet their problem.

Natchez has taken steps with the use of the primary unit to individualize instruction and allow for differing rates of academic progress. But as in the case of most educational systems, Natchez does not have the specific diagnostic data on this high risk population to determine specific instruction geared to their particular educational needs. Since it was not known why all of these children did not succeed, prescriptive teaching was impossible for all children.

The question of how to reduce this high failure rate which could be expected in any similar community and its consequent human suffering is the purpose of this "Pre-School Investigation of Specific Identification of Academic High Risks."

The failure of a child to perform in a classroom does not indicate a specific dysfunction. Such failure may be due to a variety of causes (as indicated in Section III) among which are:

(1) mental retardation and depressed IQ
(2) sensory deficits
(3) educational deficiency
(4) special learning disabilities

Depressed IQ refers to children in the 80-90 IQ range. Educational deficiency means lack of educational opportunity, inappropriate educational procedures, and conflict of values, such as cultural deprivation. Special learning disabilities is defined as dyslexia and related disorders which are perceptual motor dysfunctions.

Previous evaluation in the community suggested that mental retardation is no greater than in any similar community in the United States or approximately at the 4% level. Sensory deficits have been handled reasonably well by school-community special group interaction. Depressed intelligence, educational

deficiency and special learning disabilities have not been dealt with totally.

For rationalization of failure, any of these categories arbitrarily applied will suffice. If however, remediation or prevention is desired, specific diagnosis is demanded.

Perceptual Development Center

In the recent Natchez program "Dyslexia Classes for the Perceptually Handicapped," it was seen that approximately 10% of the school population (grades 2-9) in this area were dyslexic. Dyslexia in this program was defined as a visual-motor perception disorder caused by a dysfunction somewhere in the central nervous system. The primary disorder of the dyslexic was seen in decoding skills in reading and in varied spelling and writing problems.

As screening in this program progressed a separate diagnostic category of related disorders, particularly hyperkinesis, was recognized. An additional estimated 7 to 10% evidence the symptoms of a related disorder. Related disorders were seen as a more severe learning disability usually involving both decoding and comprehension skills as well as difficulty in math and abstractions in any subject.

It was particularly noted that these problems cause learning difficulty to children with normal to even superior IQs pulling their performance below an expected level for age and intellectual ability. It was found however that if a specific diagnosis of the reading disability was made and a specific program carried out that the students made remarkable gains in oral reading, writing and spelling skills. Students attending the Perceptual Development Center program for twenty months made an average of 2.8 years improvement in oral reading ability. Those attending for 11 months averaged 1.7 years improvement and those attending 9 months gained an average of 1.6 years. Results showed that students attending the Perceptual Development Center attained twice the progress in reading that they were able to achieve before specific instruction to their reading disability.

In July 1969 ten of the fifteen students who were dismissed in July 1968 were retested. During the year, without any specific help in reading skills, none had regressed in reading ability. Eight of these students had continued to improve and had gained an average of 1.9 years in oral reading ability.

In comparing the progress of these released students before and after specific remediation it was found that students made an average of six months progress per year before specific remediation. After specific remediation (APSL) students made an average 2.5 years gain in reading skills, or four times the progress they made previously.

After this remedial help, of great significance was the improved attitude towards school and learning of those students who had formerly failed or done poorly. After success in the learning tasks took place, emotional problems caused by frustration and failure in the classroom began to fall away. However, a few students, usually over fourteen, were extremely bitter about school and impossible to reach.

As a result of this program and the success of the remediation with such a high percentage of the students (96% of the students made a year or more of progress each nine months period) it is strongly felt by the Perceptual Development Center staff that the emphasis of such a program should be shifted from remediation to prevention. There should be a basic program of instruction for children with these problems.

The staff felt a preliminary screening mandatory to determine if children who were high risks for learning tasks could be identified at five years old with the objectives of establishing specific preventive programs. The primary and all important advantages to this procedure were to allow the child to succeed in learning from the beginning of his school career and to avoid the unbelievable pain of not succeeding no matter how hard he might try. It was felt that many of the secondary emotional problems seen in "so-called" poor students could be eliminated. Specific procedures could be helpful to them from the beginning of their school experience preventing them from struggling through the first three grades and doing poorly from the third on.

Purpose and Results of Study

To determine if early identification of specific learning problems was possible the pre-school investigation was instituted by the Perceptual Development Center staff. Three hundred and ninety-nine five-year-old kindergarten and Headstart children were tested. Children from seven white public and private kindergartens, one Negro public kindergarten class and two totally Negro Headstart centers were the subjects. A total of 241 white and 158 Negro children are included in the data.

The test battery included the Slosson Intelligence Test for Children and Adults, the Draw-A-Person Test, the Berea-Gestalt Test of Visual-Motor Perception and the Bender-Gestalt Test. All tests were individually administered. The Draw-A-Person was scored according to the Goodenough-Harris Scale. Berea-Gestalt scoring was done according to the procedure developed by the Reading Disability Center and Clinic, University of Alabama Medical School, Birmingham, Alabama, The Bender-Gestalt was scored according to the criteria of Elizabeth M. Koppitz.

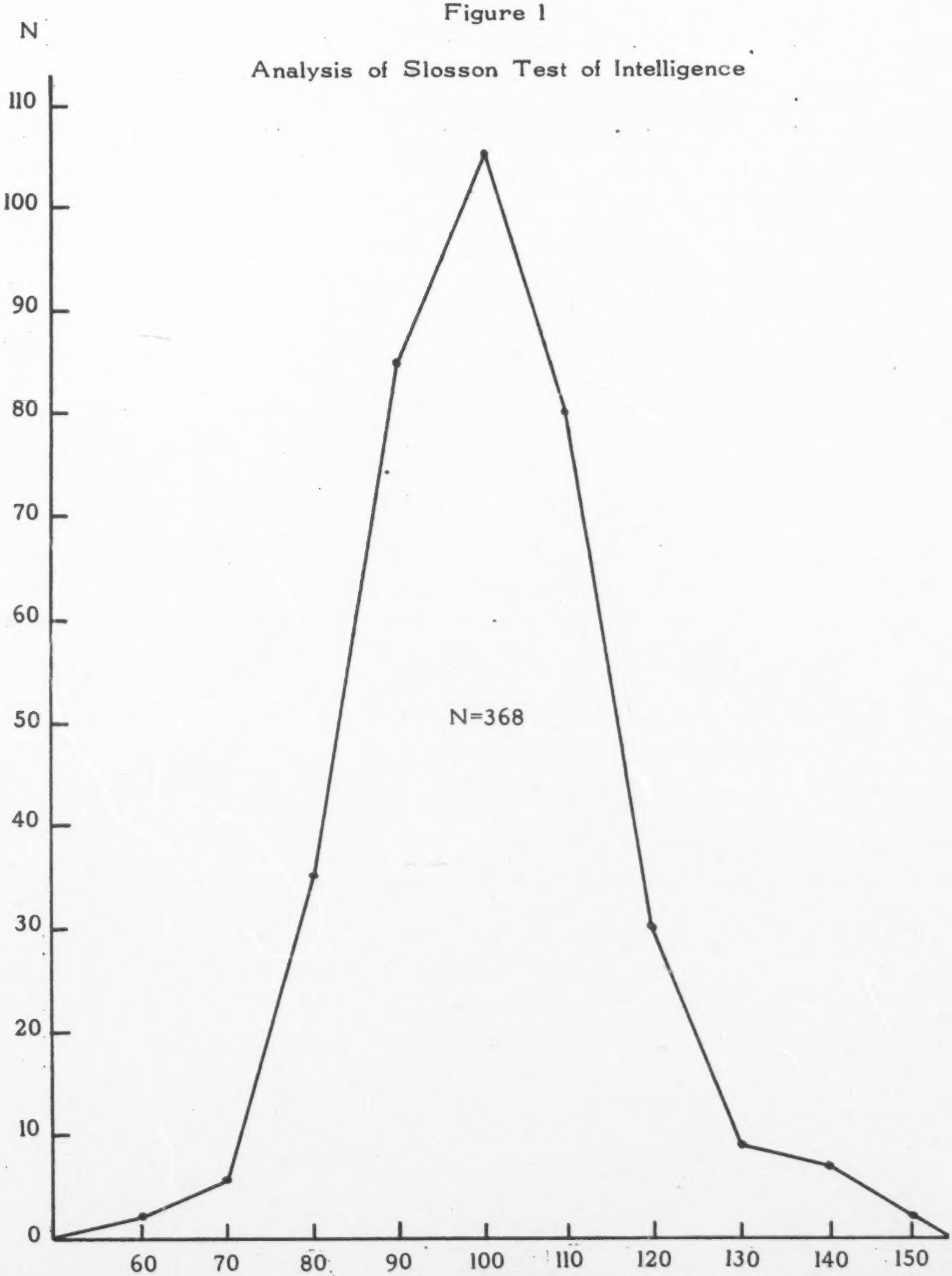
Test results revealed that 31.6 percent of the white sample evidenced defects in perceptual-motor tasks and 19.9 percent showed low mental abilities. The group showing a definitely high risk for learning comprised 51.5 percent of the sample. The Negro sample indicated that 48.5 percent evidenced perceptual-motor difficulties and 39.5 percent showed low mental abilities. The group showing a definite high risk for learning was 88.0 percent.

Slosson

The Slosson Test of Intelligence yielded a mean score of 109 for white males and a mean score of 108 for females. The total mean score for white children was 108 with a standard deviation of 14.4. The curve is presented in Figure I. The mean for Negro males was 97 and for Negro females was 101. The total mean score for Negroes was 99 with a standard deviation of 16.5. A test of significance was computed between whites and Negroes and was found to be 3.7. This was significant at the .001 percent level. Analyses of IQ range in Figure 2 indicates that while the Negro mean is only slightly lower than the white mean there is much more restriction of range. The distribution is also not normal. (Figure 2)

Figure 1

Analysis of Slosson Test of Intelligence



Item analyses of the Slosson according to the categories provided by Gillespie indicated that learning disabilities could be related to item variation as follows:

I. Perceptual-motor dysfunctioning

1. temporary insufficiency in:

a. information
b. language encoding
c. reasoning
d. cardenality
e. auditory vocal association
f. verbal comprehension

2. a breakdown in:

a. visual motor integration
b. memory of digits
c. auditory vocal sequential memory
d. auditory vocal association

II. Mental retardation

Low in all categories

Draw-A-Person

The Draw-A-Person mean for white children was 104.1 with a standard deviation of 6.24 and for Negro children it was 99.71 with a standard deviation of 6.15. A breakdown into sexes yielded slight but not significant differences between males and females. The Draw-A-Person white male mean was 105 and the female mean was 103. The Negro male mean was 98 and the female mean was 102. There were no significant differences between males and females within race or between males and females between races or between total sample between races. A discrepancy between a Slosson score and a Draw-A-Person score of 20 points or more appeared to discriminate individuals who had other characteristics which might be described as a perceptual-motor dysfunction. The failure of Draw-A-Person scores to correlate with Slosson scores is in agreement with the finding of the Berea Gestalt, i.e., that perceptual-motor functioning is not highly correlated with total IQ. The Draw-A-Person was seen as having predictive ability of academic risk in five year olds.

Bender-Gestalt

The Bender Gestalt means for white children 5.0 to 5.11 years was 14.42 with a standard deviation of 3.67. The mean for Negro children was 15.37 with a standard deviation of 3.10. A test was computed and found to be 1.05 which was not significant.

The scores were broken down further into 5-5.5, 5.6-5.11 year groups for male and female. The scores for these groupings were then compared with the Koppitz scores. Koppitz reports a mean of 13.6 with a standard deviation of 3.61 for 5 to 5.5 year group and a mean of 9.8 and a standard deviation of 3.72 for a 5.6-5.11 year group. We found a mean of 12.75 and a standard deviation of 3.72 for white females at 5.0-5.5 years and a mean of 14.50 and a standard deviation of 3.21 for white females at 5.6-5.11 years. We found a mean of 12.63 and standard deviation of 3.62 for white males at 5.0-5.5 years and a mean of 14.24 and standard deviation of 3.42 for white males at 5.6-5.11 years.

We obtained a mean of 14.66 and a standard deviation of 2.53 for Negro females at 5.0-5.5 years and a mean of 13.88 and a standard deviation of 2.72 for Negro females at 5.6-5.11 years. We obtained a mean of 16.34 and a standard deviation of 3.01 for Negro males at 5.0-5.5 years and a mean of 14.65 and a standard deviation of 3.21 for Negro males at 5.6-5.11 years.

Means and variance of the samples were compared with the Koppitz norms by means of Students T test. A T for white females 5.0 to 5.5 years was 1.2; for white females 5.6 to 5.11 years was 4.44. A t test for white males 5.0 to 5.5 years was 1.2; for white males 5.6 to 5.11 years was 6.75. A t test for Negro females 5.0 to 5.5 years was 1.15; for Negro females 5.6 to 5.11 years was 3.9. A t test for Negro males 5.0 to 5.5 years was 3.0; for Negro males 5.0 to 5.6 was 4.7. Inspection indicated that means and variance for sample breakdown for age and sex was not generally significant.

Of statistical significance were male and female, white and Negro means on the Bender at the 5.6 to 5.11 year level. These were significantly higher than reported by Koppitz (at the .001 level of confidence).

When a graph (See Figure 3) for 5.0 - 5.11 years was prepared from the combined scores it followed a normal curve. The Bender for this sample seemed to indicate developmental perceptual motor ability and did not separate the abnormal from the normal at this age level.

Koppitz reports a correlation of .79 for five-year-olds on the Stanford-Binet Intelligence Scale, Form L and the Bender Gestalt. Since the Slosson correlates with the Stanford-Binet in the .90's, it is reasonable to assume that we have approximately the same IQ measure as Koppitz. However, as seen in Table 39, no significant relationship was found between the Bender and Intelligence.

Since the Koppitz norms could not be employed and since the curve was not normal and hence a cut-off point of 1 standard deviation above the mean used to indicate abnormality as suggested by Koppitz could not be employed, we had to conclude that while suggestive, the Bender when scored by the Koppitz procedure cannot be used effectively at the five year level to screen samples such as ours for high or low academic risk.

Figure 2

Slosson Test of Intelligence
Analysis of Range

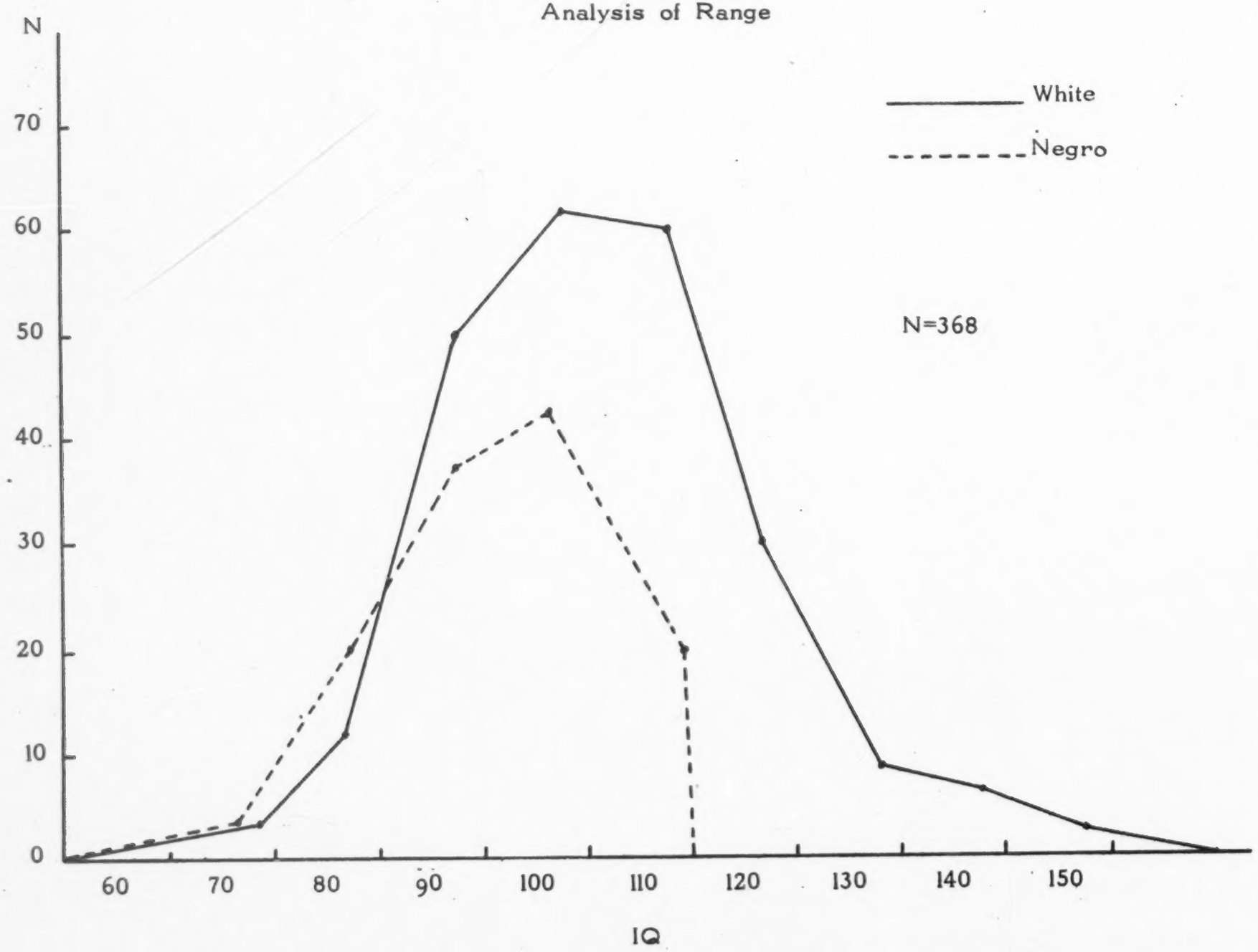


Figure 3

Analysis of Bender-Gestalt Scores

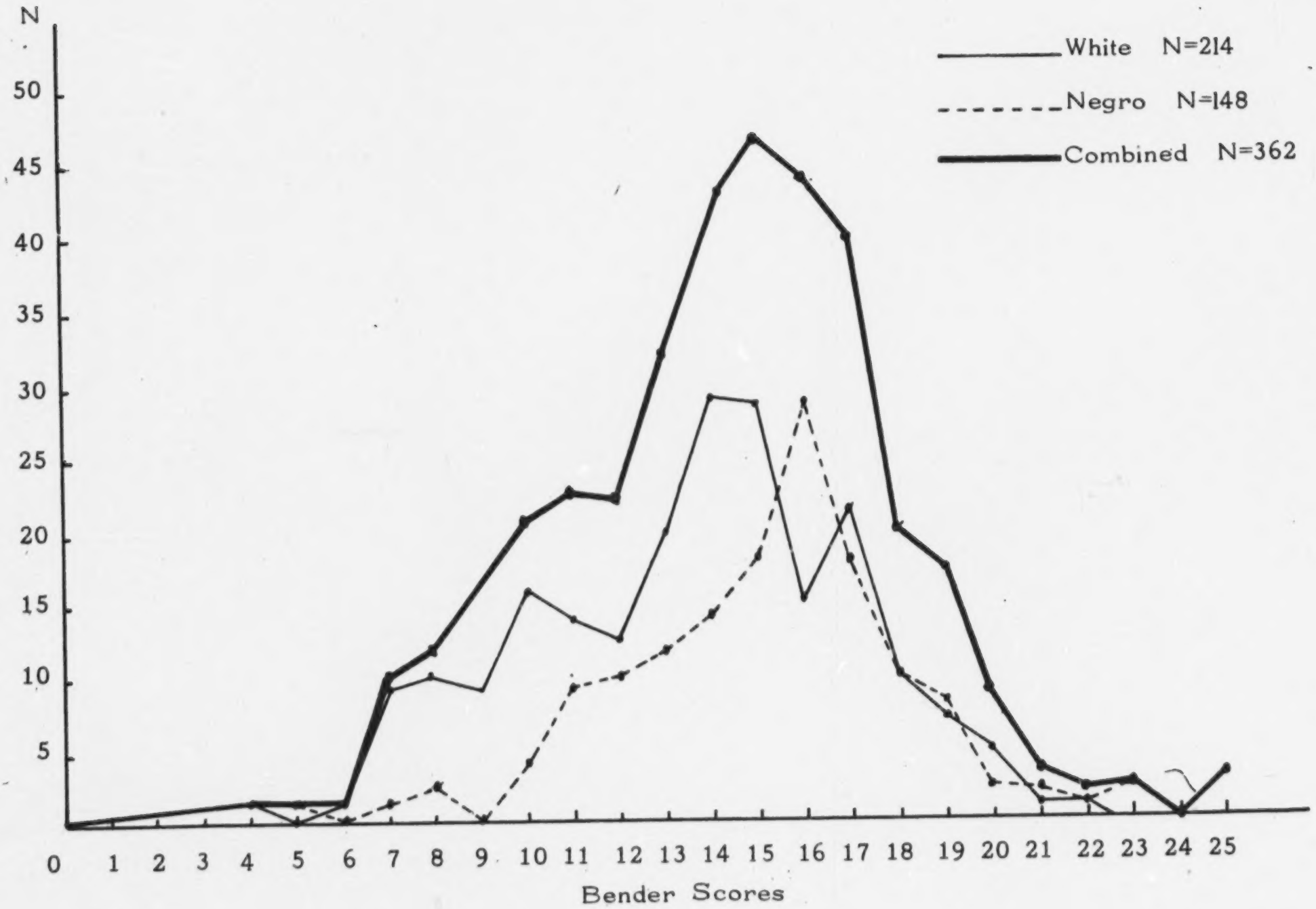
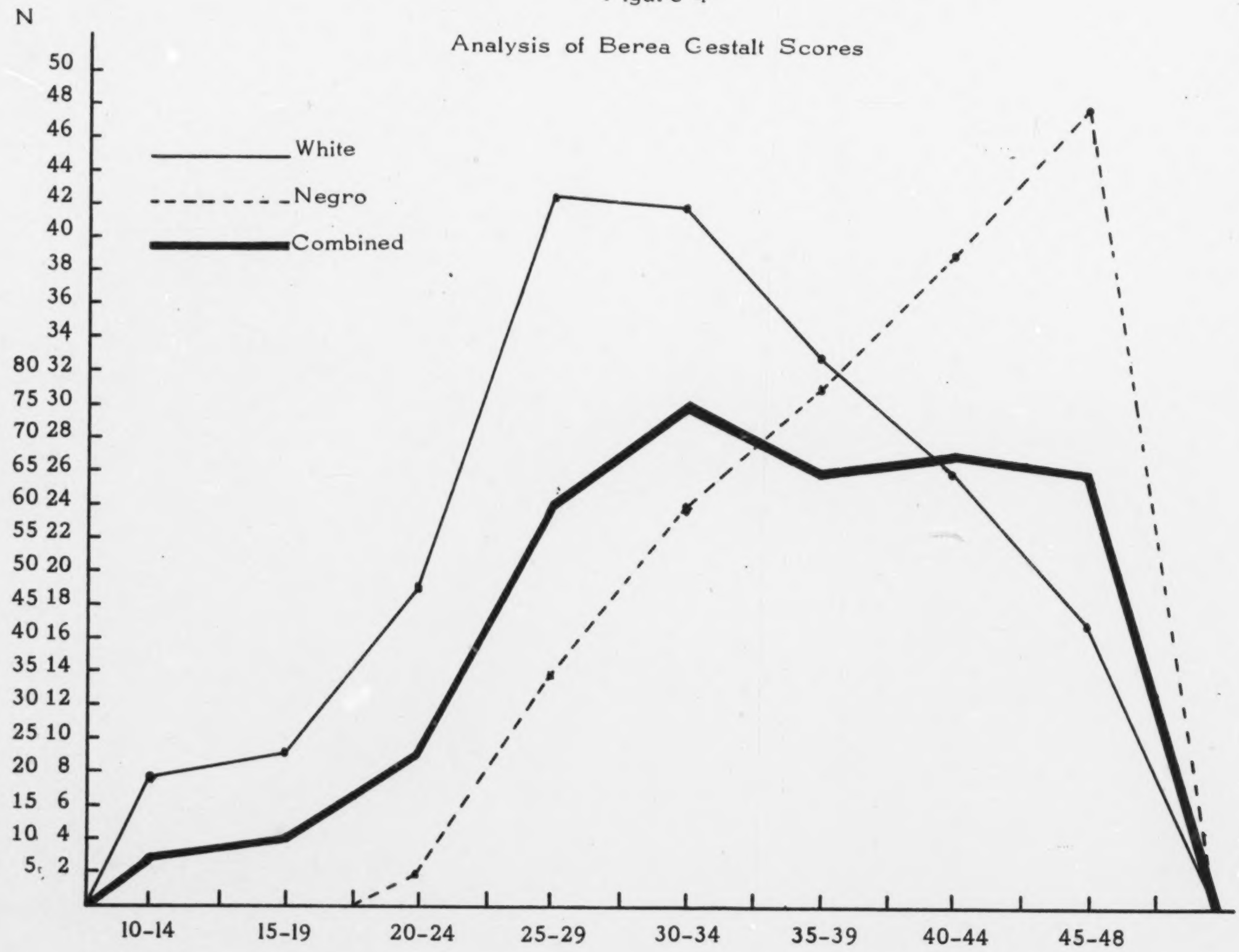


Figure 4

Analysis of Berea Gestalt Scores



Berea Gestalt

Means and standard deviation were computed for the 5.0 to 5.5 year level and the 5.6 to 5.11 year level, male and female groups for Negro and white on the Berea-Gestalt. Tests of significance were run. None of these were significant. Scores were pooled for the 5.0-5.11 year range. The white males had a mean of 30.05 and the white females had a mean of 32.12. The total white mean was 31.3 with a standard deviation of 9.0 The Negro mean was 39.30 for females and 39.86 for males with a total mean of 39.62 and a standard deviation of 6.68. A t test between total white and total Negro sample yielded a ratio of 7.15, which is significant well beyond the .001 level of confidence. The scores are plotted in Figure 4.

The scores on the Slosson Intelligence Test for Children and Adults were grouped in 10 point intervals, i.e., 50-60, 60-70, etc. The Berea-Gestalt scores falling within each group were then computed. The results are presented in Table 43.

TABLE 43
BEREA-GESTALT SCORES AND SLOSSON INTELLIGENCE TEST
FOR WHITE AND NEGRO

	WHITE				NEGRO			
	MEAN SLOSSON	MEAN BEREA	MEAN BENDER	N	MEAN SLOSSON	MEAN BEREA	MEAN BENDER	N
0-69	57.00	48.00	20.00	1	65.00	48.00	17.00	1
70-79	78.00	37.50	14.50	2	76.00	44.16	16.16	6
80-89	85.87	39.53	16.33	15	86.09	42.57	16.29	21
90-99	95.71	35.59	15.33	49	94.27	38.77	14.50	30
100-109	104.52	34.38	14.45	65	102.80	37.77	15.30	44
110-119	114.52	31.10	12.67	61	114.53	37.29	14.24	17
120-129	124.71	28.26	11.83	35	122.00	33.91	13.55	11
130-139	133.42	34.92	13.08	12	135.00	45.00	18.00	1
140-149	144.00	33.00	12.00	5				
150-159	154.67	25.67	11.33	3				

This indicates that there are no significant relationships between intelligence and perceptual-motor performance at the five year level. Some slight differences may be noted but in most instances these are expressions of a small n. This is in contradiction to the notions that perceptual-motor tasks are related to intelligence in children also to the findings of Koppitz. The failure to find such a relationship between the Berea-Gestalt and the Slosson is probably due to the fact that the Berea is scored in terms of clinical deviations instead of developmental ones while Bender is scored in terms of developmental criteria instead of clinical aberrations. It is also likely that this difference accounts for the greater useability of the Berea as a screening device for five year olds than the Bender. This is expressed in the spread of scores and the smoothness of the curve. A curve computed from Berea-Gestalt scores is slightly skewed to the left, i.e., with a slight piling up of high error scores. This is to be expected if the device is to predict high risk academic cases.

Summary of Findings:

The following findings for each test and test as a battery were:

1. Slosson Test of Intelligence

   a. The Natchez population is normal with regard to IQ.
   b. The Slosson Test of Intelligence provided patterns of performance which were indicative of:

      1. perceptual-motor dysfunction
      2. poor mental abilities

   c. The mean score on the Slosson is not significantly different at the 5 year level for whites and Negroes, however there is a more restricted range of Negro performance.

2. Draw-A-Person

   a. Natchez scores on the Draw-A-Person were normal.
   b. Some children evidenced a discrepancy between a Slosson and the Draw-A-Person score of 20 points which correlated with a high Berea score, which was indicative of perceptual problems.
   c. The mean score on the Draw-A-Person for whites and Negroes at the 5 year level is not statistically significant.

3. Bender-Gestalt

   a. Inspection indicated that means and variance for sample breakdown for age and sex was not generally significant.
   b. It is statistically significant that Koppitz scores were higher than sample mean scores for sex of the 5.6 to 5.11 year old group.

c. Since the Koppitz norms could not be employed, it was concluded that while suggestive, the Bender when scored by the Koppitz procedure cannot be used effectively at the five-year level to screen samples such as ours for high or low academic risk.

4. Berea-Gestalt

a. No difference appeared for age and sex between groups.
b. There was no significant relationship between intelligence and perceptual motor performance at the five year level. There was a highly significant difference between Negro and white performance on the Berea-Gestalt Test of visual motor perception.
c. The Berea was found to be predictive of high or low academic risk.
d. And a cut-off score of 35 is suggested to indicate abnormal perceptual motor performance.

As the tests were evaluated patterns emerged which seemed to be predictive of high adademic risk. They are as follows:

High Risk Patterns Indicated
by the Specific Identification Battery

Specific Learning Disabilities

1. Normal or better score on Slosson Test of Intelligence
2. Specific pattern of spotty performance on Slosson
3. Performance on Draw-A-Person indicating a discrepancy of 20 points of more lower than the Slosson
4. Berea score of 35 with a standard deviation of 8 or more indicating visual-motor-perception dysfunction.

Low Mental Abilities

1. Low score on Slosson
2. Pattern of performance on Slosson consistently low in all areas
3. Performance on Draw-A-Person commensurate with IQ
4. Berea score may or may not indicate visual-motor-perception dysfunction

6. Further establishing this battery as predictive of academic high risks are comparison of failures on readiness and achievement test (See Appendix IV)

Conclusion:

That since predictions of specific learning disabilities and low mental abilities can be made at five years of age, that specific programs for these children should be planned which will benefit the school, the community, the parent and most importantly, the child.

Section V

Suggestions for Further Programs

As a result of the Pre-School Investigation of High Academic Risks and because of the success of the Perceptual Development Center 1969 - 70 class for 6 and 7 year olds, the staff feels the primary focus of the learning disabilities program should be on prevention. It is surmised that a kindergarten and first grade program for high risk students would alleviate many of the problems of these students if they were not found until later grades after academic failure.

The Perceptual Development Center staff suggested that many preventive or remedial educational programs have failed because the educators did not determine the real reasons for learning failure but blamed lack of personnel and money for pupil failure or one of the easily proffered causes, bad parents, bad teachers, poor home environment, etc. This has not proved true. Using "immaturity" or "non-readiness" as a general cause for poor first grade performance is especially dangerous - as it delays specific identification of causation of academic failure.

Shedd (1969) points to the fallacy of the "theory of readiness" as ordinarily used by educators and one of the most prevalent scapegoats for failure to learn.

He notes that educators have accepted physical readiness models, mainly one study on the simple motor skill of walking as generally applicable to readiness for learning. Ruch (1958) who offered the physical readiness study said "The neuromuscular structures of the body must reach a certain stage of development (maturation) before they are capable of responding to stimulation. For example, a child cannot perform a certain activity such as walking, until he has developed the physical structures necessary for the activity, regardless of the amount of training he receives."

Shedd says, "The question which is critical is not whether walking is maturationally determined but whether from a number of well-conducted experiments on the nature of walking one may generalize to problems of conceptual development. It would appear more probable that development in the conceptual area would be dependent on the background of the child and would not follow a rigid pattern of development which cannot be modified through special training without any long-term results, is limited only to certain relatively simple motor skills, but more complex aspects of development can be influenced substantially through appropriate training procedures.

He continues, "The overwhelming weight of evidence indicates that conceptual development and the development of complex motor skills are highly dependent upon training. Far from having to wait until the maturation process has produced a state of readiness, training in such skills seems to be a major determinant and can be undertaken with profit at an early age, even perhaps as early as the second year of life.

Citing evidence from studies by Fowler (1962), Beach and Jaynes (1954), Pasamanick and Knoblock (1960), Hebb (1949), Melzack (1962), Gibson, Walk Peck and Tigue (1959), Scott (1965), and Money, Hampson, and Hampson (1957), Shedd concludes, "The point quite obviously might be that if a child has not had the necessary experiences to learn to read by six years of age, he may have missed the early learning experiences and training may be more difficult. In other words the notion that postponement of a task until "maturation" has progressed to the stage where the task might be easily undertaken ignores the possibility that intensive learning might be required before such skills can be acquired.

Quoting Johnson and Myklebust (1967, p. 149) Shedd mentions that they point out: "The acquisition of each symbol system requires a number of integrities. It assumes ability to integrate nonverbal experience, that the individual will be able to differentiate one symbol from another, attach meaning to it, and retain it. For example, in acquiring auditory language the child must differentiate the symbol cat from the other symbols that he hears; he must associate this particular auditory unit with the animal; next he must store the symbol for future use and be able to recall and say it when communicating with others. Likewise, in learning to read he must be able to discriminate cat from other visual symbols, associate with experience, with the auditory symbol, and remember it."

He states that reading instruction as usually practiced by the schools assumes that reading is based upon some unitary developmental process. No formal educational procedures are required in producing "readiness" and in teaching reading. Since "readiness" comes about as a consequence of some mystical force operating within the organism, all that is required is an encouraging situation in which the child can obtain meaningful vocabulary from meaningful experience. As may be seen this is an incidental method of learning. Some have, indeed, learned by this method, others in spite of it, and still others not at all.

In this article he clearly questions the traditional educational view of "maturation." He suggests that physical maturation for a motor task such as walking cannot be applied to conceptual learning tasks such as reading. That such a conclusion can lead educators to waiting for a maturation to occur when, in fact, the student is not just immature but has a specific learning disability for which specific teaching procedures are required.

In a study of 105 dyslexic students enrolled at the Reading Research Institute in 1967 Shedd reported that 64% of the sample had been diagnosed as immature by the teacher, guidance counselor or other adult. 49% of the total sample had been retained one or more years and 5% had been socially promoted. 32% of the sample had received tutorial help only, 6% had received remedial help only, and 23% had received remedial and tutorial help. A total of 71% had received remedial and/or tutorial help. 31% of those retained received additionally tutorial and/or remedial help. In addition, 17% of the total had received psychiatric counseling. Only 4% had been retained or socially promoted without additional help or diagnosis.

After testing and specific identification as dyslexics, Shedd's specific program of instruction was employed for 8 weeks of concerted effort. Retest at the end of this instruction as measured by the Gates-McKillop Oral Reading Test indicated an increase of 1.93 grade levels.

Shedd states "The implications to education are fairly obvious; what time, energy, effort, money and frustration might have been eliminated by diagnosing the children properly when they first entered school. How much easier it might have been to train the children if unlearning or reorganization had not been required.". (C. Shedd, 1969.)

Teaching for these students must be innovative, new, and specific. Remedial programs which follow the same basic pattern but slower will not work with learning disabilitied students.

Proposed Program 1970-73:

The Perceptual Development Center staff proposes a program containing one experimental kindergarten and three experimental first grade sections. The goals and objectives suggested for this kindergarten and first grade program are as follows:

1. Identify children who are high risk for learning tasks at the pre-school or first grade level. - Objective (1) The kindergarten and first grade students will be identified as high risk for learning tasks by the Pre-School Investigation Battery consisting of Draw-A-Person, Berea, Slosson.

2. Instruct teachers in the specific procedures of teaching these students. Objective (2) Teachers will be instructed in specific teaching procedures by workshops, in-service training courses and regular consultant evaluations and their performance evaluations by supervisory personnel and the student progress.

3. Instruct the high risk children with specific procedures in a demonstration center. Objective (3) The kindergarten students will achieve self respect and a responsibility for the rights of others in a school setting through a modified Montessori practical life and sensory program and will gain a basic knowledge of the alphabet, phonics, writing and number concepts through the APSL Introduction Book and Montessori beginning math material as measured by the Metropolitan and Stanford Readiness Test and the ITPA.

Objective (4) The first year students will achieve knowledge of reading, writing, spelling and number facts through APSL Introduction, Book I and II and Shedd's math material as measured by the Gates Oral Reading Test and the Metropolitan and Stanford Achievement Tests.

Objective (5) The kindergarten and first year students will improve fine and gross motor coordination skills through the use of Shedd's Perceptual Motor Skills program as measured on the Shedd Perceptual Motor Skills Check-List.

Objective (6) The kindergarten and first year students will develop a positive attitude toward school and learning tasks because of their success as measured by personality questionnaires and teacher check-lists.

4. Evaluate the success of this identification and instruction.
Objective (7) The kindergarten and first year students; success in learning tasks of reading, writing, spelling, number concepts, motor coordination, and the developing positive attitudes toward school will be measured on Metropolitan Reading and Achievement Tests, other achievement measures, personality questionnaires and check-lists and results compared with previous kindergarten and first grade performance in the Natchez School System.

5. Disseminate results
Objective (8) Teachers, administrators, community and family will obtain knowledge of the Pre and Early School Specific Instruction Program by dissemination of information through speeches, radio and television appearances, newspaper releases, and newsletters.

The staff should include:

a. Director

Plan and coordinate demonstration center, programs developed in the Region, dissemination of information testing services, workshops and in-service training courses. Supervise classroom instruction and curriculum of demonstration center and programs developed in the region, administer supplies and materials for Center.

b. Supervisor of Testing

Plan testing and the evaluation of program with the chief educational consultant, Dr. Charles Shedd.

c. Kindergarten Teacher

Teach experimental kindergarten class with modified Montessori techniques working into APSL at the language training phase of Montessori.

d. Teachers

Qualified classroom teachers with beginning training course in specific instruction for learning disabilities.

e. Teacher Aides

Qualified aides with special workshop in specific instruction for learning disabilities.

f. Director of Volunteers

Public relations director in charge of dissemination of information, disseminating reports and finding and scheduling volunteers.

g. Consultants

Dr. Charles Shedd, Chief Consultant; Director, Reading Research Institute, Berea College, Berea,Kentucky; Director, Reading Disability Center, University of Alabama Medical School, Birmingham, Alabama. Dr. Shedd is a foremost authority in learning problems. He is familiar with the Natchez School System and personnel from his work there on previous research and programs. His background as Director of his present programs qualify him as supervising the specialized instruction of more reading disabilitied children than any other consultant in the U.S. The sizable amount of data provided by him and his staff on specific learning disabilities and the original and unique program material he offers provides a basis for the identification and instruction of such a program as this. Dr. Shedd will give the yearly workshops on learning disability instruction at the pre-school and first grade level as well as visit and evaluate the program and the instruction twice a year. He will contribute his vast knowledge to identification and instruction to the building of the program.

Dr. June Shelton - Texas Woman's University, Denton, Texas. Dr. Shelton is a Speech and Hearing Therapist with broad background in learning disabilities. She has modified the Montessori approach to instruct learning disabilitied children and through this knowledge can contribute to the kindergarten and first year curriculum of this program. She will conduct yearly workshops in the summer.

Dr. Donald Killelea, Pediatrician - Dr. Killelea is vitally concerned with learning disabilities and has supported and worked with all efforts to obtain programs in the area for children with learning disabilities. He is a valuable link to the medical community. He will have monthly staff meetings with the center personnel.

Dr. Charles Stern and Dr. Richard Naef - Noted ophthalmologist and neurologist and can give to the program knowledge from their fields concerning learning disabilities. They will have meetings with the staff yearly.

Procedures and program content will be:

A 1. Identify children who are high risk for learning tasks at the pre-school or first grade level

Testing will be done by the Supervisor of Testing and the staff. Workshops, provided for kindergarten through three teachers, each summer will instruct the classroom teacher to administer these tests so that she may eventually take over this task.

The initial test battery will consist of those tests found to give significant data in the pre-school study. Those will be the Berea-Gestalt, the Slosson, and the Draw-A-Person. These tests will be administered individually and scored as related in the study.

2. Instruct teachers, etc.

Workshops and in-service courses will be provided each summer by the consultant staff. Specific procedures suggested to these teachers will consist of Montessori techniques adaptive to the learning disabilitied child in kindergarten as well as specific instruction in the Alphabetic-Phonetic-Structural-Linguistic Approach to Literacy series and the Reading Research Institute number concept program. Perceptual motor skills and auditory discrimination training will be part of the curriculum. An art and civics program will be included.

3. Instruct the high risk children

These children will have specific and different procedures taught them by teachers trained in the use of and the reasons for using them. Volunteers will provide some instruction on a one-to-one basis. They will receive

special emphasis in the areas in which children with these problems usually have difficulties - reading, writing and spelling. Number concepts will be begun early, perceptual motor skills training will provide training in this definite area. Auditory discrimination training is provided to improve spelling and reading skills and for listening training. The art program will allow manipulation of creative mediums. The civics program will teach the basic manners of school and values of right and wrong in which it has often been found that children with learning disabilities are weak.

4. Evaluate

Evaluation procedures by the staff will test-retest data for a quantitative evaluation of statistical results of the program. Achievement tests and standardized measures of reading, writing and spelling will be employed. Qualitative evaluation will be gathered through questionnaires to parents, teachers, supervisors, staff members and observers. Dr. Charles Shedd and Dr. June Shelton will evaluate the program in writing.

5. Dissemination results

Results will be printed and disseminated to interested agencies and others on request. They will be used by the school system to plan the direction of the grant for the next year.

B. Similar procedures have been used very successfully with older students and it is strongly believed that with adoption they will be the strongest program available for this project.

C. The skills to be learned here as stated above are reading, writing, spelling, number concepts, beginning addition and substraction, auditory discrimination, perceptual motor skills, and structured behavior in the school situation. Materials to be further developed for use at this age are listed in Section 3, Number 2. Information to be gained concerns the progress of five and six year olds in a program specific to their disabilities as opposed to the regular on-going education program. Significant gains would be expected in a shift of 10% of the population out of the high risk or failure category.

The Natchez-Adams County School is funded in 1970-71 through Title III, ESEA, to institute the Early Education Study herein described. Evaluation is planned for each year and over a three year period of funding.

It is the obligation, the responsibility, the business of the educational establishment to identify these children early and to provide them with the specific educational services that they will need.

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Project Headstart
American Adademy of Pediatrics

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PERCEPTUAL DEVELOPMENT CENTER ACTIVITIES

SUMMER 1967	SEPTEMBER 1967-MAY 1968	SUMMER 1968
Program Grant Award 7/1/67	Program Opening Sept. 67-44 students,2 teachers, 1 director,1 supervisor of testing, sec. modified by director, added 1 sec., 1 teacher. Hour-a-day classes opened 4 Results PDC avg. prog. Y 1.9, 0 2.4 Hour-A-Day Cathedral 1.3 (8 mo.) Washington .9 (50hrs.) Braden 1.9 (150 hrs.) Morgantown .5 (50 hrs.) No. of volunteers-100 No. of observers-124	Program Added assistant director 43 PDC students continued regular attendance at Center 4 hrs. da. for June and July. Afternoon program 8 wks/25 students. Avg. prog. 1.2 yrs
Workshop or In-Serv. Training Angie Nall and Dr. C. Shedd, Dr. E. DuBard/Language Dis. for Intro. to Learning Disabilities (50 teachers) (200)	Workshop or In-Serv. Training	Workshop or In-Serv. Training Jones-Teach. In-Serv. for (50 teachers) Shedd-Int. to Learn. Dis. (50)
Testing Testing for students to attend PDC (150 tested)	Testing (Adams, Franklin, Wilkinson Co.) 20% of school pop. referred for testing. Dyslexic-10.2% Related Disorder (Not identified this year.)	Testing Referral testing Preparation of statistical data for Project Evaluation
Dissemination of Information	Dissemination of Information Request for Information-285 Speeches-46 Vol. Workshops-45 Trips-0 Newspaper Articles-63 Radio & TV Interviews-6 Magazine Articles-2 Publications-0 Consultant Visits-2	Dissemination of Information

PERCEPTUAL DEVELOPMENT CENTER ACTIVITIES

SEPTEMBER 68-MAY 69	SUMMER 1969	SEPTEMBER 69 - JUNE 70	TOTALS
Program	Program	Program	Program
4 classes/61 students 4 teachers/4 aides, 1 director/1 ass't. director/ 1 supv. of test./1 dir. of vol./1 motor coordination director/ 3 sec. Hour-a-day classes-approx 20 Results PDC 20 mos 2.8 11 mos.1.7 9 mos. 1.6 HAD 1.7 No. of volunteers-298 Observers-159	2 two-hour sessions individual reading session/ auditory discrimination for 112 students (8 wks) Av. prog. 5 mos.	4 classes/65 students same staff as 68-69 PDC classes 31 mos. 4 yrs 22 mos. 3.9 yrs 20 mos. 2.8 yrs 11 mos. 1.0 yrs 9 mos. 2.1 yrs HAD classes-approx 20 No. of vol.-287 Observers-92	No. of stu. PDC-101 Avg. prog. per. yr-2 yrs HAD classes-approx 500 Avg. prog. per. yr.-1.52 yrs. No. of vol.-685 Observers-375
Workshop or In-Serv Tr	Workshop or In-Serv Tr Jones-Teaching In.-Serv (54) Harvey-Test. In-Serv. (20) Sym. on Learn Dis. (160) Jones, Shedd, Flowers, Frierson	Workshop or In-Serv Tr Richardson - APSL tea (40), Harvey-Test. In-Serv. (20)	Workshop or In-Serv Tr No. Workshops or In-Serv.-10 No. teachers inv.-644
Testing Adams-11.4% of sch. pop. referred. Dyslexic-6.8% Related Dis.-2.3% Franklin & Wilkinson Co. 2.1% referred Dyslexic 12.5%	Testing Referral testing Preparation of statistical data for Proj. Eval.	Testing Adams-60% referred Dyslexic-4% Hyperkinetic-3% Pike Dyslexic-4.4% Hyperkinetic-4.4% June-Final Proj. Eval	Testing No. tested-3867 % Dyslexic-approx 15% % Hyperkinetic-approx 5-7%
Dissemination of Info Request for Info-238 Speeches-15 Vol. workshops-37 Trips-11 Newspaper Arts.-74 Radio & TV-19 Magazine Arts.-4 Publications-2 Consultant Visits-2	Dissemination of Info	Dissemination of Info Request for Info-123 Speeches-41 Vol. workshops-21 Trips-19 Newspaper Arts-63 Radio & TV-0 Magazine Arts-2 Publications-0 Consultant Visits-6	Dissemination of Info Request for Info-646 Speeches102 Vol. workshops-93 Trips-30 Newspaper Arts-200 Radio & TV-25 Magazine Arts-8 Publications-2 Consultant Visits-10